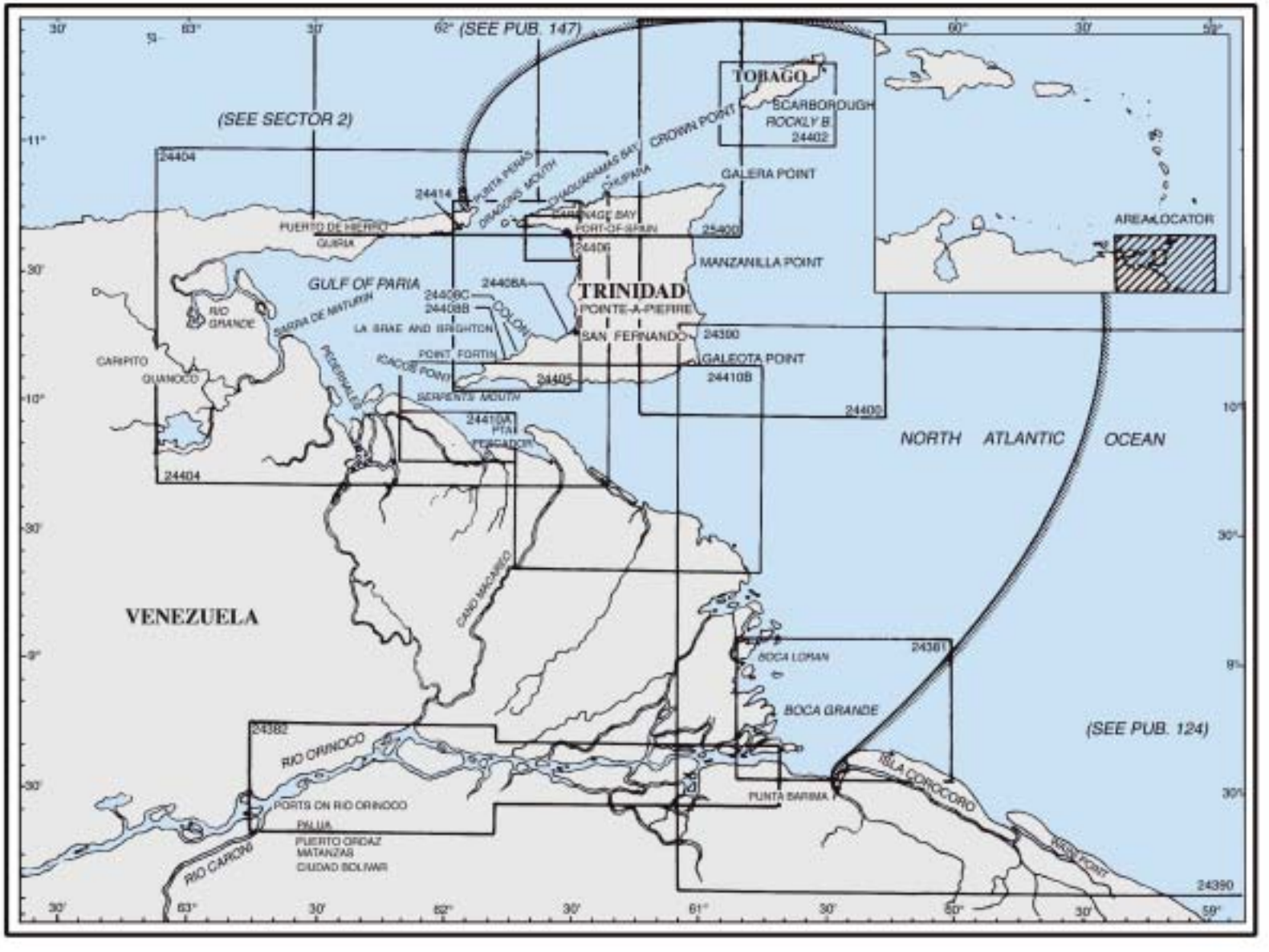
Select "See Sector" to be Hotlinked to that Sector



Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.

SECTOR 1 —CHAR T INFORMATION

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SECTOR 1

TRINIDAD AND TOBAGO—THE GULF OF PARIA AND THE RIO ORINOCO

Plan.—This sector first describes Tobago and then the N, E, and S coasts of Trinidad. The approaches to the Gulf of Paria are then described, including Dragons Mouth and Serpents Mouth. The W coast of Trinidad and the W shores of the Gulf are then described in a N to S sequence. The tributaries of the Rio Orinoco flowing into the Gulf of Paria and its S approach are described with the Gulf of Paria. The Boca Grande waterway of the Rio Orinoco is described separately.

General Remarks

1.1 Tobago, the outermost island described in this sector, is 26 miles long and lies 19 miles NNE of Trinidad. Trinidad and Tobago is an independent member state of the British Commonwealth.

Trinidad, the second largest and southernmost island of the West Indies, lies 7 miles from the NE extremity of Venezuela. It is 50 miles long, 37 miles wide, and is crossed by two mountain systems. Port of Spain, the principal commercial port, is situated on the W coast of the island.

Vessels passing between Tobago and Trinidad must avoid Drew Bank (11°05'N., 60°50'W.) and the shoals lying on it. Less water than charted was reported (1986) to lie on this bank. The bank and several unmarked off-lying dangers lying off the E coast of Trinidad require prudent navigation when in this vicinity. Vessels may stay clear of Drew Bank by keeping outside the 40m curve, which may best be seen on the chart.

The Gulf of Paria lies between Trinidad and the mainland coast of Venezuela. Several ports are situated within the gulf.

The Venezuelan river ports of Caripito and Pedernales are entered through river entrances, which lie in the SW and S part of the gulf.

Vessels proceeding to the ports within the gulf generally prefer to use the Boca Grande Channel of the Dragons Mouth due to the intricate passages of Serpents Mouth and the numerous oil platforms and drilling rigs situated in the middle and S parts of the gulf.

The Boca Grande waterway of the Rio Orinoco, which lies 110 miles SE of Serpents Mouth, is the only improved and maintained channel for vessels proceeding to Palua, Puerto Ordaz, and Ciudad Bolivar.

Winds—Weather.—The area covered by this sector lies at the SW end of the NE trade wind system of the North Atlantic. Over the open sea to the N of 10°N, winds from the E and NE predominate for most of the year. These winds do not generally exceed force 6, except in heavy squalls. Land and sea breezes occur along the mainland coast and to some extent around Trinidad; however, they are seldom strong enough to do more than modify the prevailing trade wind.

The main hurricane season in the E part of the Caribbean usually occurs from the beginning of August to mid-September, but has been known to occur as early as June and as late as November. The storms usually do not come S of 12°N, but a heavy swell and rough seas may be experienced along the coastal area. Only one hurricane passed S of Trinidad in the years from 1901 to 1963, and the only one to affect Trinidad in these years did so in the month of June.

Squalls of varying intensity are rather common, especially those associated with thunderstorms, which are more frequent near the land than over the open sea. White squalls, which are squalls with little or no cloud, may occur in any season, both along the coast and at sea, and are usually accompanied by a turbulent sea which rapidly subsides when the squall has passed.

Fog is practically unknown at sea and is uncommon on the coast.

Temperatures are almost uniformly high and, when accompanied by high humidity, can cause some discomfort especially in calm conditions.

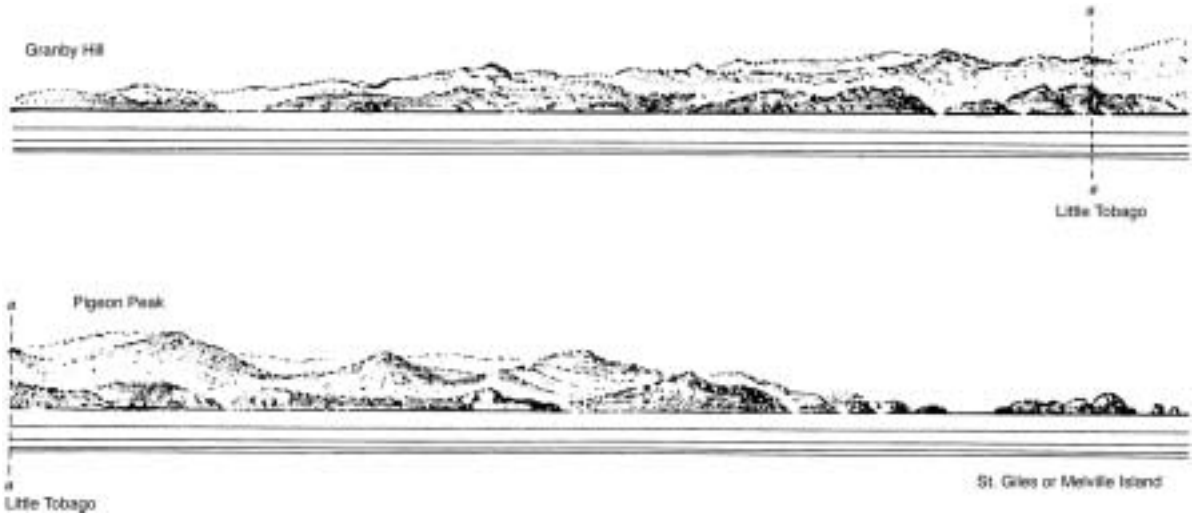
Tides—Currents.—The surface currents described in this sector are governed by the North Equatorial Current and the South Equatorial Current. Current speeds and directions vary only slightly with the seasons and generally set W or NW. The greatest local variations in the current pattern result from winds and storms.

Off the N coasts of Trinidad and the Peninsula de Paria, the current becomes strongest from July to October, with speeds ranging between 1.5 and 2 knots. River discharge in the E part of Venezuela exerts considerable influence on coastal water movement, especially during the rainy season. The same is true of the water flowing into the Gulf of Paria during the rainy season through Serpents Mouth and out of Dragons Mouth. The rate of the currents at such times may range from 2 to 2.5 knots. The current turns W and joins the Equatorial Current to the N of Dragons Mouth.

Under normal weather conditions, the tidal currents flow into the Gulf of Paria from both ends through Dragons Mouth and Serpents Mouth while the tide is rising. They flow out through both channels while the tide is falling.

1.2 **Tobago** (11°15'N., 60°40'W.), lying 19 miles NNE of Trinidad, has steep-to coasts and, in places, is indented by bays, some of which are suitable as anchorages. A ridge of irregular mountains, which attains an elevation of 582m, extends almost two thirds of the length of the island from its NE extremity. The summits of this ridge are mostly rounded and do not have any of the volcanic features that can be seen in some of the islands to the N. The slope on the N side of the ridge is generally steep, but on the S side there are several fertile valleys which lie between the spurs of the hills extending to the coast. The SW section of the island consists of low-lying plains, from which numerous hills rise.

During the winter, the NW side of the island is subject to a ground swell which occasionally breaks heavily over Buccoo Reef and Drew Bank, SW of Crown Point. At such times, vessels have to leave the bays on that side of the island. The SE side of the island is continually exposed to a heavy swell.



Saint Giles Islands to Little Tobago

Scarborough, at Rockly Bay on the SW side of the island, is the chief town, while Charlottesville, at Man-of-War Bay on the NE side of the island, is the largest.

Anchorage can be taken in Man-of-War Bay, Great Courland Bay, King's Bay, and Rockly Bay. The latter bay is most frequented by vessels; however, King's Bay is deeper and provides shelter from prevailing winds.

Saint Giles Islands (Melville Islands) (11˚ 21'N., 60˚ 31'W.), a rocky and steep-to group, lie 0.5 mile N of the NE extremity of Tobago. The southernmost and largest island is 114m high. Marble Island, the N of the group, is 45m high and almost white. London Bridge is 49m high and the W island of the group. It is formed by a prominent rock, shaped like an arch. A light is shown from the E end of Saint Giles Islands.

A rock, awash, lies midway between the largest island of the Saint Giles group and the NE extremity of Tobago. Pointed Rock lies close NE of the latter point. There is a least depth of 27m in the channels lying on either side of the rock, awash, but they are both narrow and a considerable current sets through them. Vessels are advised to pass N of the Saint Giles Islands outside of the 40m curve.

1.3 Man-of-War Bay (11˚ 19'N., 60˚ 34'W.) is entered between North Point, located 1.8 miles WSW of the N extremity of Tobago, and Corvo Point, 1.5 miles WSW. It recedes about 1 mile to the head. A reef fringes North Point and extends up to 0.1 mile N of it. An islet lies near the seaward extremity of this reef. Booby Island, 33m high and steep-to, lies near the head of the bay and a detached patch, with a depth of 4.3m, lies close NE of it.

A light is shown at the head of the bay, 0.7 mile E of Booby Island.

The E and S shores of the bay are fronted by a reef. Several above-water rocks lie on this reef and on all sides of the bay. An islet, 37m high, lies 0.5 mile ESE of Corvo Point; Cardinal Rock, which dries 0.5m, lies 0.2 mile E of the point.

Charlottesville (11˚ 19'N., 60˚ 33'W.) is situated in the SE corner of Man-of-War Bay and may be identified by some scattered small houses and a row of bungalows on the shore.

Hermitage House stands on the SW side of the bay, 0.8 mile SW of Corvo Point. This conspicuous dwelling has a green roof and is surrounded by trees. An anchorage, with depths of 22 to 33m, lies within Man-of-War Bay. Smaller vessels can anchor close inshore.

Between Corvo Point and **Courland Point** (11˚ 13'N., 60˚ 47'W.), 13.5 miles SW, the coast is generally steep-to and rocky.

The Brothers, consisting of two rocks, lie close offshore, about 2 miles W of Corvo Point, and are 5m high. Two isolated rocks, which break, lie in the vicinity of the 40m curve, WSW of The Brothers. The passage leading between The Brothers and The Sisters should not be attempted.

The Sisters (11˚ 20'N., 60˚ 39'W.), a group of rocks, lie 3.5 miles W of Corvo Point and are marked by a light. The N rock of this group is 30m high.

This part of the coast is indented by several small bays. From the NE they are Bloody Bay, Parlatuvier Bay, Englishman's Bay, Castara Bay, King Peter's Bay, and Fromager Bay. These bays only afford anchorage to small craft with local knowledge. Castara Bay, lying 7.5 miles SW of Corvo Point, is the only one that affords any shelter.

1.4 Great Courland Bay (11˚ 12'N., 60˚ 47'W.), a slight indentation, is entered between Courland Point and Hawk's Bill, 0.8 mile SSW. A light is shown from Courland Point.

Barrel of Beef, a rock, has a depth of 0.6m and lies about 0.2 mile SSW of Courland Point. A rock, above-water, lies between the latter point and Barrel of Beef.

Plymouth is situated in the NE corner of Great Courland Bay. The church, a wooden building with a red roof and a small spire, stands in the SW part of the town. The remains of an old fort stand on the S side of Courland Point. A pier, in ruins, extends from the shore abreast of the town.

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Anchorage can be taken, in a depth of 18m, about 0.5 mile SW of Courland Point. Small vessels can anchor closer in. No vessels should anchor in depths of less than 13m. When the wind is from the NE, a swell sets into the bay, but the holding ground is good. This is the principal anchorage on the NW side of Tobago.

Stone Haven Bay is entered between Hawk's Bill and Rocky Point, l mile SW. It is exposed and of little use as an anchorage.

Little Courland Bay (Mount Irvine Bay) is entered between Rocky Point and Booby Point, 1 mile SW. A rock, 11m high, lies close off the latter point. A white house, with a red roof, stands on high ground about 0.8 mile ESE of Booby Point. Anchorage can be obtained, in a depth of 13m, within the NE part of the bay. The berth lies with the white house bearing 166° and about 0.8 mile distant. This anchorage, although preferable to that in Great Courland Bay, may at times become untenable.

Caution.—Care should be taken to avoid numerous fish nets and traps which may be encountered in the N part of Great Courland Bay.

1.5 Pigeon Point (11° 10'N., 60° 50'W.) is located 1.8 miles WSW of Booby Point; Buccoo Bay is formed between the two points. A shoal, with a depth of 0.6m, lies about 0.2 mile W of Booby Point and breaks in heavy weather.

Buccoo Reef extends about 1.3 miles N and 0.5 mile NW from Pigeon Point. Its outer edge dries and is clearly defined. A small and sandy islet, 0.6m high, lies on the NE part of this reef. According to local information, the position of this islet may vary with changing weather conditions. Lighted buoys mark the N and W extremities of the reef.

Milford Bay, marked by a light close N of the airfield at its head, is entered between Pigeon Point and Sandy Point, 1.3 miles S. A rock, with a depth of 1.8m, lies on the edge of the shore bank, about 0.5 mile NNE of Sandy Point. A landing place is situated about 0.1 mile SSW of Pigeon Point.

When approaching Milford Bay, care should be taken not to round Crown Point or Buccoo Reef too closely.

Crown Point (11° 09'N., 60° 51'W.), marked by a light, is located 0.5 mile SSW of Sandy Point and forms the SW extremity of Tobago. The 5m curve lies about 0.4 mile offshore to the S of this point and breakers form on the ledge.

An SPM (National Petroleum Buoy) is moored about 0.5 mile WNW of the light in a depth of 14m. Berthing takes place in daylight hours only.

Caution.—Three submarine cables, which may best be seen on the chart, extend SSW from the head of Milford Bay across Galleons Passage to Trinidad.

Anchorage is prohibited within 0.2 mile of the cables in Milford Bay and vessels should not anchor within 2 miles of the cables in Galleons Passage.

Tyrrel's Bay (11° 18'N., 60° 32'W.) lies between a point located 2.5 miles S of the N extremity of Tobago and another point, 0.8 mile SSE. Its shores are fringed by reefs which extend up to about 0.3 mile seaward in places. A detached shoal, with two above-water rocks lying on it, is located about 0.3 mile ENE of the N entrance point of the bay.

1.6 Little Tobago (11° 18'N., 60° 30'W.), an irregularly-shaped island, is 141m high and lies 1 mile offshore, E of Tyrrel's Bay. Black Rock lies 0.5 mile NE of the N extremity of this island; Long Rock lies about 1 mile W of it. Goat Island lies in the mouth of the bay, 0.5 mile W of the island. The W side of Goat Island is fringed with reefs and numerous above-water rocks lie close off it's N and S ends.

Several above and below-water rocks lie within 1 mile S of Little Tobago. Depths of 37 to 55m lie in the channels leading between Little Tobago and Goat Island, and between Goat Island and Tobago. The N current setting in these channels attains rates of 2.5 to 4 knots.

Anchorage can be taken, in depths of 26 to 44m, in the middle of Tyrrel's Bay, W of Goat Island.

The channel leading between South Rock (11° 17'N., 60° 31'W.) and Little Tobago should be avoided. The current divides SW of Little Tobago and sets through the channel at a considerable rate.

From the S entrance point of Tyrrel's Bay, the coast trends 1.5 miles S to Cape Gracias-a-Dios (11° 16'N., 60° 32'W.) and then about 1 mile SSW to Pedro Point. This stretch of shore should be avoided by small craft as the current setting constantly against the wind raises a rough sea.

King's Bay (11° 15'N., 60° 33'W.) is entered between Pedro Point and a point located 1.3 miles SW. The bay extends about 1 mile NW. A detached shoal patch, with a depth of 11.9m, lies in the middle of the bay, WNW of Pedro Point. A shoal, with a depth of 6.1m, and a rock, with a depth of 2.7m, lie about 0.2 mile NE and about 0.3 mile NW, respectively, of the above patch.

The best anchorage in Tobago may be obtained within King's Bay, which is sheltered from the prevailing winds. The best berth lies near the head of the bay, in depths of 22 to 37m, fine sand with practically no tidal current.

Queen's Island (11° 14'N., 60° 33'W.), which is 55m high, lies close offshore, about 0.5 mile SSW of the SW entrance point of King's Bay. A rock, which dries 0.6m, lies about 0.1 mile S of the island; another rock, 3m high, lies close N of it.

Queen's Bay, entered close W of Queen's Island, has several shoal patches lying across its entrance, but provides anchorage to small craft with local knowledge.

Roxborough Rock, 16m high, lies 0.8 mile WSW of Queen's Island. Richmond Island, 44m high, lies 0.2 mile offshore, 2.3 miles SW of Queen's Island. This island is divided into two parts, with a hummock on each. The bight lying between this island and Queen's Island is known as Carapuse Bay.

Mangrove Bay, Richmond Bay, and Goldsborough Bay lie SW of Richmond Island. These bays afford anchorage to small vessels with local knowledge.

Goldsborough Bay and the coast extending for about 1 mile SW of it is bordered by Great River Shoal (11° 12'N., 60° 37'W.). This shoal has depths 4.5 to 9m and the sea breaks heavily over it during strong ESE winds.

1.7 Granby Point (11° 11'N., 60° 40'W.), surmounted by the ruins of a fort, is located 4.3 miles SW of Richmond Island. Smith Island, marked by a light, lies about 0.1 mile ESE of the point. This island is 15m high; a rock lies close SW of it.

Barbados Bay lies NW of Granby Point. Hillsborough Bay is located W of the point. The latter bay is clear of dangers and provides anchorage, in a depth of 11m, within its E part.

A bank extends about 0.5 mile E from the coast, 1.3 miles SSW of the head of Hillsborough Bay. It has a least depth of 6.5m, which breaks during a strong breeze.

Minster Point, located 2.5 miles WSW of Granby Point, is 52m high. Minster Bay is entered between this point and Bacolet Point, 0.8 mile SW. A rock, which dries 0.5m, lies about 0.5 mile WSW of Minster Point. Minster Rock is composed of several large boulders. It has a least depth of 2m and lies 0.5 mile SSW of Minster Point. This rock usually breaks and is marked by a lighted buoy moored close WSW of it.

Rockly Bay (11°10'N., 60°44'W.) is entered between Bacolet Point and Lowlands Point, 3.8 miles SW. The town of Scarborough, fronted by a port area, stands in its NW part. Lowlands Point, which is 14m high, is fronted by a reef extending up to 0.1 mile seaward.

Red Rocks, 4m high, lie in the W part of the bay, 1.5 miles W of Bacolet Point. Middle Shoal, with a depth of 3.5m, lies near the approach to Scarborough, about 0.5 mile NE of Red Rocks.

The clear part of the roadstead, which lies along the NE side of the bay, has depths of 11 to 29m. The middle and W parts of the bay are encumbered by numerous unmarked shoals which break with fresh trade winds.

1.8 Scarborough (11°11'N., 60°44'W.)(World Port Index No. 11700), a small port, includes a roadstead and a small inner harbor at the head of the bay. Large vessels anchor in the roadstead and work cargo via lighters. The lighters must be arranged in advance from Port of Spain, Trinidad.

Depths—Limitations.—The harbor is formed by a breakwater which protects a wharf fronting its N side. The wharf is 140m long and has a depth of 4.6m alongside at LW. A jetty extends 0.1 mile SSW from the N side of the harbor. Its W face, which is 180m long, has a depth of 9m alongside and is used by passenger vessels. Its E face, which is 150m long, has a depth of 8.5m alongside and is used by general cargo vessels. Several ro-ro berths are situated at the landward end of this berth.

Vessels of up to 200m in length and 8m draft can be accommodated in the harbor.

Aspect.—Fort George, along with several radio towers standing close N of it, is conspicuous from seaward. Burleigh House, a white building with a flat roof, stands 1.3 miles WSW of the town and is prominent. It is reported that the buildings in the town do not show up well until vessels reach the upper part of the bay.

A light is shown from the head of the breakwater. A marina and a fishing boat harbor lie close N of the breakwater.

Pilotage.—Pilotage is compulsory. Pilots must be requested at least 48 hours in advance through Port of Spain, Trinidad. Vessels should contact the North Post Coast Radio Station. Pilots can be contacted by VHF and board about 0.3 mile SW of Lodge Point (11°10'N., 60°44'W.).

Anchorage.—Anchorage can be taken, in depths of 11 to 29m, mud and sand, near the head of Rockly Bay. These anchorages are safe, but the trade winds send in a continuous swell, making lighterage work difficult.

Directions.—Vessels approaching from the SW should keep Fort George Light bearing less than 012° until they are clear of the shoals extending ESE from Red Rocks (11°10'N., 60°45'W.). They should then steer on the lighted entrance range toward the anchorage. Vessels approaching from the E should stay clear of Minster Rock and then proceed as above.

1.9 Columbus Point (11°08'N., 60°48'W.), the S extremity of Tobago, is located 5.3 miles WSW of Bacolet Point. It is low and fringed with reefs.

Petit Trou, a small and foul bay, is entered close W of Lowlands Point, E of Columbus Point. A rocky bank, with depths of less than 5.5m, extends 0.5 mile E and about 0.1 mile S from the E entrance of the bay.

Crown Point is located 2.8 miles WNW of Columbus Point. A shoal flat extends up to about 1 mile offshore between these two points. Heavy breakers may be seen on the W edge of this flat, close off the point, even in the calmest weather.

Drew Bank (11°05'N., 60°50'W.), lying within the 40m curve, extends 4 miles S and then 7 miles W from a position located 2 miles S of Crown Point. It was reported (1986) that less water than charted was found on this bank.

Wasp Shoal, with a depth of 4.8m, lies on the N extremity of Drew Bank. It was reported (1986) that a depth of 1.5m was found in the vicinity of this shoal. The shoal is usually marked by overfalls and may cause unexpected and heavy breakers to form even in the calmest weather. The fairway of the channel leading between Wasp Shoal and Crown Point has depths of 15.8 to 33m. The tidal current in this channel sets strongly to the W.

Drew Shoal (11°05'N., 60°54'W.), with a least depth of 6m, lies near the SW extremity of Drew Bank. A ripple usually exists at the edge, and the whole NW side of the bank can be identified when the tidal current is running strongly.

1.10 Trinidad (10°30'N., 61°15'W.), the southernmost island of the West Indies, is separated from Tobago by Galleons Passage. The island lies with Gallera Point, its NE extremity, located 19 miles SSW of Crown Point, Tobago. The Gulf of Paria indents the W side of the island. This gulf contains numerous safe anchorages for all classes of vessels, even during the hurricane season.

A ridge of heavily wooded mountains, 450 to 940m high, extends along the N side of the island. El Cerro del Aripo, the tallest peak, is 940m high and rises 21 miles WSW of Galera Point. Mount Tacuche, 936m high, stands 10 miles W of El Cerro del Aripo. The interior of the island is low and swampy to the S of the ridge.

The S side of the island is bordered by a range of hills which are considerably lower than the mountains along the N side. Trinity Hill, 304m high, stands 8 miles W of Galeota Point, the SE extremity.

Naparima Hill, 177m high, stands close to the coast about 130 miles ENE of Punta del Arenal, the SW extremity of the island. It is the only elevation along the W coast.

The N coast of Trinidad is rocky and the sea breaks on it with such violence that it is impossible to land, except at a few

Galera Point from NE

places under favorable conditions. The best shelter for small vessels is in Maracas Bay.

The E coast of Trinidad is so straight that no anchorages are provided for large vessels, although there are a few places where small vessels can find temporary shelter. The best anchorage is in Cocos Bay, W of L'Ebranche Rocks.

The S coast of Trinidad has very few off-lying dangers.

The approaches to the N coast are generally clear, with most of the fringing dangers lying no more than 0.5 mile offshore.

Delaware Bank (10˚ 50'N., 60˚ 25'W.), a detached shoal, extends for about 3 miles. It has a least depth of 27m and lies centered 29 miles E of Galera Point. A shoal, with a depth of 14.6m, was reported to lie about 34.5 miles E of Galera Point.

Emerald Shoals, a coral bank about 6 miles long, has a least depth of 5.5m on its N part and lies 16 miles ESE of Galera Point. Prospector Patch, with a least depth of 11m, lies close E of this bank.

Caution.—Many drilling platforms, wellheads, and pipelines exist off the coasts of Trinidad.

1.11 Darien Rock (10˚ 32'N., 60˚ 38'W.), lying 14 miles S of Emerald Shoals, is a detached and steep-to rocky head with a least depth of 2.4m. A wreck is located on this danger, which is occasionally marked by rips and breakers. When approaching this rocky head from the S, the numerous oil rigs in the vicinity make very useful marks for navigating around it.

Manzanilla Bank (10˚ 24'N., 60˚ 54'W.), with depths of less than 20m, extends about 17 miles ENE from Point Radix. The seaward end of this bank, which consists of several detached patches, has depths of 12 to 20m, coral. The current causes rips and a confused sea over parts of this bank.

Tides—Currents.—The South Equatorial Current enters the Caribbean Sea setting in a WNW direction at a rate of 3 knots. This current divides off the SE coast of Trinidad, with one part setting N along the E coast and then W into the Caribbean Sea. The other part flows W along the S coast into the Gulf of Paria and then N, finally emerging through Dragons Mouth. Close offshore and within the gulf, they may be reversed or offset by local tidal currents.

Along the N coast of Trinidad, E of Grande Riviere Bay, the E setting tidal currents are overcome by W currents setting between the island and Tobago. Close inshore, between Grande Riviere Bay and Chupara Point, the E tidal current sets along the coast for the last 2 hours of the ebb and sometimes for the whole duration. The E tidal current is always prevalent W of Chupara Point.

The current increases in strength and its direction becomes more N as Entrada Point is approached. The rate of the W tidal current decreases as Entrada Point is approached, but is greater offshore than near the coast.

Off the N entrance to the Gulf of Paria, the N and NW setting tidal currents attain rates of 2 to 3 knots according to the season of the year.

A branch of the Guiana Current sets through Serpents Mouth. This current turns N into the gulf and emerges through Dragons Mouth to rejoin the main body of the W Guiana Current, along the N coast of Trinidad.

Tidal currents in the N entrance to the Gulf of Paria seldom exceed a rate of 1 knot at springs.

Off the N entrance to the Gulf of Paria, the N flow attains a rate of 2 to 3 knots depending upon the season, the strength of the current, and the outflow from the Rio Orinoco. The outflow from this river is strongest between July and October. Rates of up to 5 knots may be experienced between the islands lying off the W coast of Trinidad.

1.12 Galera Point (10˚ 50'N., 60˚ 55'W.), 15m high, is rocky and covered by coconut palms. Neptune Rock, awash, lies 0.5 mile E of the point and always breaks. This danger should be given a berth of at least 1 mile because the current sets strongly toward it. The point is marked by a light and the structure has been reported to be radar conspicuous.

Mormacland Bank, with a least depth of 20m, lies with its shallowest part located 3.8 miles N of Galera Point.

A bank, with a depth of 17m, and a detached shoal, with a depth of 13.5m, lie 3 miles NNW and about 1 mile N, respectively, of Galera Point.

Toco Bay (10˚ 50'N., 60˚ 57'W.) is entered between Reefs Point, located 1.8 miles W of Galera Point, and a group of above-water rocks lying close offshore, 1.5 miles WSW. A heavy swell rolls into this bay and it is not recommended as an anchorage.

Grande Riviere Bay, lying 6 miles W of Toco Bay, affords temporary anchorage in a depth of 16.5m. The berth lies with the E end of a sandy beach at the head bearing 166˚ and the E entrance point bearing 086˚ .

Grand Matelot Point (10˚ 49'N., 61˚ 08'W.) is located 5 miles WSW of the W entrance of Grande Riviere Bay. The coast between is high and rocky, though in a few places there are sandy beaches. A number of above and below-water rocks front the coast and lie within the 10m curve. A light is shown from Petite Matelot Point, 1.5 miles E of Grand Matelot Point.

From Grand Matelot Point, the coast trends 13.5 miles W to Chupara Point. Vessels may anchor, in depths of up to 33m, mostly mud, anywhere off this stretch of coast and up to 1 mile offshore.

Machapure Rock, awash, lies 9 miles W of Grand Matelot Point and is the outermost danger off this part of the coast.

1.13 Chupara Point (10°49'N., 61°22'W.), marked by a light, the most prominent headland on the N coast of Trinidad, is steep, cliffy, and 118m high. It is reported to be radar conspicuous. Filette Point, the NE extremity of the headland, is fronted by above-water rocks extending up to about 0.5 mile E of it. A reef, which usually breaks, extends up to 0.3 mile W from the W extremity.

Chupara Bay is entered between Chupara Point and Abercromby Point, 2.5 miles SW. It affords anchorage sheltered by Chupara Point, but is not recommended. A radio mast, 61m high, stands 5.8 miles SSE of Chupara Bay.

Las Cuevas Bay is entered between Abercromby Point and Las Cuevas Point, 1.3 miles W. It provides anchorage with Abercromby Point bearing 065° and 0.3 mile distant, but is exposed to the prevailing N wind.

Maracas Bay (10°46'N., 61°26'W.), entered 1.5 miles W of Las Cuevas Bay, has a depth of 29m in its entrance and gradually shoals to a depth of 9m near the head. This bay, though open to the N, affords better shelter in its SE corner than any other anchorage along this coast. However, being under high land, the winds experienced here are variable.

La Vache Islet, 55m high, lies 4 miles W of Las Cuevas Point and close off a small point that separates Balata Bay from La Vache Bay. Neither of these two bays provides safe anchorage, nor do Morne Mal d'Estomac Bay and Sainte Cite Bay, lying farther W, because of the heavy swell setting into them.

Maravaca Islet (Saint d'Eau Islet) (10°46'N., 61°31'W.), 113m high, lies 0.5 mile N of Medine Point, which separates Morne Mal d'Estomac Bay from Sainte Cite Bay. The islet is wooded and marked by a light.

The coast between Medine Point and Corozal Point, 6 miles WSW, is bold, rocky, and without shelter. A conspicuous white tower stands on Corozal Point and a disused satellite tracking antenna, 35m high, stands 0.3 mile S of it.

North Post Signal Station stands, with its flagstaff and prominent radio masts, on a hill, 2.8 miles E of Corozal Point. It was reported (1990) that an artificial reef had been established within 0.3 mile of Corozal Point.

Maqueripe Bay, entered 1 mile SW of Corozal Point, has a below-water rock lying close N of its NE entrance point. Two other rocks, which break, lie off its SW side. In good weather, anchorage can be taken, in a depth of 44m, about 2.5 miles W of this bay.

1.14 Entrada Point (10°43'N., 61°40'W.), the NW extremity of Trinidad, is located 4.3 miles SW of Corozal Point. A peak, 539m high, rises 2.3 miles E of the point and its easternmost summit is surmounted by a prominent radio tower.

The E coast of Trinidad between Galera Point and Galeota Point, 42 miles S, consists of one rocky stretch with three sandy beaches, each about 10 miles long. These beaches are separated by irregular points of moderate height. A heavy surf rolls in along this entire section of the coast. Cumana Bay, with sandy beaches at its head, lies 3 miles SW of Galera Point and Guayamaya Point is located 1.8 miles S of it. The coast between the latter point and Islet a Bateau, lying 3.5 miles SW, is cliffy up to within 0.8 mile of the islet and then it becomes sandy.

Balandra Bay, entered close S of Islet a Bateau, has a sandy beach at the head. A black building, with a red roof, stands on its N shore. Small vessels with local knowledge can anchor in a depth of about 5m off the N shore of the bay.

Saline Bay (10°42'N., 61°01'W.), lying W of Fronton de Saline, provides shelter to small craft with local knowledge. A rocky islet, 12m high, fronts Fronton de Saline, 1.8 miles SW.

Matura Point, located at the base of the N range of mountains, is the termination of the rocky coast. A river discharges 1 mile SW of the point. The coast to the S consists of an almost straight, sandy shore lined with coconut palms. The sea breaks on this stretch with such violence that landing on any part of it is impracticable. The Oropuche River discharges 4.5 miles S of Matura Point.

Matura Bay lies S of Saline Bay and is entered between Matura Point and Manzanilla Point (10°31'N., 61°01'W.), 10 miles S. The coast between Matura Point and the Oropuche River consists of low, red sand cliffs. Between the latter river and Manzanilla Point, the coast rises in a series of prominent cliffs, 15 to 24m high, which are streaked with red and white and backed by dense jungle. Several prominent wooded peaks stand within 12 miles WSW of Manzanilla Point.

McMillan Rock (10°37'N., 60°59'W.), with a least depth of 7.5m, lies about 2.5 miles E of the mouth of the Oropuche River. An isolated shoal, with a depth of 7.5m, lies about 1.3 miles SE of this rock.

1.15 Manzanilla Bay (10°30'N., 61°01'W.) is formed close W of Manzanilla Point. It consists of a small and sandy indentation protected on the E side by some rocky islets, up to 5m high. Two wedge-shaped rocks, 5m high, lie about 0.1 mile E of Manzanilla Point. A reef, which dries 0.3m, extends up to about 0.5 mile E of the point and breaks heavily. A light is displayed ESE of Brigand Hill.

L'Ebranche Rocks (10°30'N., 60°59'W.) lie on a shoal bank, 2.3 miles SE of Manzanilla Point. These rocks, which dry 1.2m, always break. A small rock, awash, lies near the extremity of the shoal bank, 0.8 mile W of the rocks. The bank, which usually breaks, extends up to 0.5 mile NE from L'Ebranche Rocks. Near its edge, the depths decrease suddenly from 20m to 4.5m.

Cocos Bay is formed between Manzanilla Point and Point Radix, 11.3 miles SSE, and encompasses Manzanilla Bay. Several rivers discharge into this bay. The Ortoire River, the largest in Trinidad, enters the bay close W of Radix Point. The shores of the bay are low and sandy. They are fringed with coconut palms which extend up to 0.5 mile offshore and make landing almost impossible. Anchorage can be taken, in a depth of 9m, mud, W of L'Ebranche Rocks and 1.8 miles SSW of Manzanilla Point.

Radix Point (10°20'N., 60°58'W.), a prominent headland, separates Cocos Bay from Mayaro Bay. It is 91m high, bold, radar conspicuous, and has high cliffs on three sides.

Mayaro Bay, a shallow indentation, is formed between Radix Point and Galeota Point, 12 miles SSW. The beach lying at the

N end of this bay is sandy and fringed with coconut palms. A chapel, almost hidden by trees, stands on the coast, 5 miles SSW of Radix Point. From a point located 2 miles S of the chapel, the beach extending to Galeota Point is backed by cliffs, 6 to 12m high. These cliffs are densely wooded with an occasional tall palm.

Heavy breakers occur along the entire length of this part of the coast and prevent landing at any time. A strong S current sets inshore.

A prominent radio tower stands 6 miles N of Galeota Point.

Tourmaline Shoals encumber the N part of Mayaro Bay and form a bank of foul ground, with depths of 5.5 to 10m, which extends to within 2 miles of the shore. This bank extends to within 2.5 miles ENE of the chapel.

Caution.—An extensive oil and gas field, with production platforms, extends up to 22 miles ENE and 20 miles E of Galeota Point. Numerous submarine pipelines lie in this vicinity and extend between the platforms and Galeota Point. Another platform is reported to be situated about 30 miles ESE of Galeota Point. The northeasternmost group of platforms in the area are reported to be radar conspicuous. Anchorage is prohibited within 0.5 mile of the platforms.

1.16 Galeota Point (10°08'N., 61°00'W.) (World Port Index No. 11772), the SE extremity of Trinidad, is the site of an offshore terminal. The point is formed by a narrow promontory. Its outer end, which is 64m high, is connected to the mainland by lower land. The seaward side of the point is composed of white cone-shaped cliffs, which appear as islands from a distance. Three detached rocks, about 7m high, lie close off the SW side of the promontory. An area of foul ground extends up to about 0.5 mile SE of the point. The point should be given a wide berth as the current in this vicinity sets toward it.

Depths—Limitations.—An SBM is moored in a depth of 29m about 2.5 miles SSW of Galeota Point. The buoy is 11m in diameter, marked by a light, and equipped with a radar reflector. It is connected to the shore by a submarine pipeline which extends NNE. The buoy is designed to handle tankers up to a maximum of 250,000 dwt.

Vessels bound for the terminal should pass E and S of the oil rigs in the area, E of Galeota Point, and then approach Galeota Point with a heading between 040° and 050°.

Pilotage.—Pilotage is compulsory. The pilot and loading master can be contacted by VHF and usually board about 3 or 4 miles SW of Galeota Point. Vessels should send an ETA at least 72 hours in advance and confirmation messages 24 hours and 12 hours before arrival. Vessels are normally berthed during daylight hours only.

Anchorage.—Anchorage is prohibited within 1 mile of the SBM and 0.5 mile of the submarine pipeline.

Guayaguayare Bay (10°08'N., 61°02'W.) is entered between Galeota Point and Gran Cayo Point, 4.3 miles WSW. It is a sandy and shallow bight which affords shelter in the E part to small vessels with local knowledge. A jetty extends about 0.3 mile SW from the W side of Galeota Point and has a depth of 4m alongside its outer part.

Anchorage can be taken, in a depth of 8.2m, good holding ground, about 1 mile SW of Galeota Point.

In the channel leading between Trinidad and the mainland, S of Galeota Point, the W current attains a rate of 1.5 to 2 knots, increasing to 3 knots in the vicinity of Serpents Mouth.

The coast between Gran Cayo Point and Cape Casa Cruz, 6.5 miles WSW, is steep and rocky. It is fronted by shoals extending up to about 1 mile offshore in places. Trinity Hills, 304m high, rises about 0.8 mile inland.

From Cape Casa Cruz, the coast, which is steep with several slight indentations, trends 6 miles W to Moruga Point (10°05'N., 61°16'W.). Several sandy beaches fringe this stretch of the coast and are separated by projecting points, which are fronted by rocks. A light is located close NW of La Lune Point midway along this section of coast. The hills standing W of Trinity Hills gradually decrease in height. The Moruga River discharges close W of Moruga Point.

1.17 Taparo Point (10°04'N., 61°38'W.), marked by a light, is located 22 miles W of the Moruga River. This section of the coast is 31 to 46m high and covered by low shrubs. Occasional distinctive outcrops of yellow sandstone occur along this stretch. A number of prominent houses stand on the heights of Palo Seco Bay, 2.5 miles ENE of Taparo Point. Anchorage can be taken as convenient over a bottom of sand and mud anywhere off this coast between Moruga Point and Taparo Point. A moored storage tanker, with a racon, is located on the Venezuelan side of the channel opposite Palo Seco Bay.

Erin Bay (Herine Bay) is entered between Erin Point, located 1 mile W of Taparo Point, and Islote Point, 8 miles W. This bay may be identified by three conspicuous cliffs. Quoin Cliff rises 3 miles NW of Erin Point. It is 49m high, red, and wedge-shaped. A red cliff, 80m high, rises 2 miles W of Quoin Cliff. A white cliff, 23m high, rises 1.5 miles W of the red cliff.

La Fabiana, a prominent flat-topped hill, rises 2.5 miles N of Erin Point and is 117m high.

Erin Bay is bordered by a bank, with depths of less than 5m, which lies about 1.5 miles offshore. A reef lies on this bank, about 4.5 miles W of Erin Point. At times, a volcanic islet is reported to be formed on the reef. An isolated shoal bank, with a least depth of 7.3m, lies 3.8 miles S of the reef.

The coast between Islote Point and Punta del Arenal, 9 miles W, is low and sandy, except for some mud and clay cliffs rising 3.8 miles W of the former point.

Punta del Arenal is marked by a light; a dangerous wreck lies about 1.8 miles SE of it. A wreck, which dries, lies 1.5 miles SW of Galfa Point.

None of the bays formed between Taparo Point and Punta del Arenal provide shelter from the prevailing ESE wind, but the holding ground is good and anchorage may be taken as convenient.

The Gulf of Paria

1.18 The **Gulf of Paria** (10°25'N., 61°48'W.), an extensive body of water with moderate depths, is bordered on its E side by Trinidad and by the coast of Venezuela on its other sides. The gulf has two entrances. Dragons Mouth is the N and preferred entrance, and Serpents Mouth is the S entrance. Serpents Mouth, although not as safe as Dragons Mouth, is available to vessels of moderate draft. It is advisable to exercise extreme care when using this passage, especially at night.

Vessels proceeding to Port of Spain from the E save little time by using Serpents Mouth.

The ports within the gulf are important as transshipment centers for bauxite, iron ore, and petroleum products. Port of Spain, situated on the W side of Trinidad, is the principal commercial port. Chaguaramas Bay and Carenage Bays provide bauxite terminals. Pointe-a-Pierre, La Brea, Brighton, and Point Fortin are important oil terminals. Puerto de Hierro and Guiria are situated on the S side of Peninsula de Paria. The latter port serves as a pilot station for vessels proceeding to the Venezuelan river ports of Caripito and Pedernales, situated in the SW part of the gulf.

Depths—Limitations.—The fairways of the channels leading through Dragons Mouth have general depths in excess of 20m. Boca Grande, the largest and W of the four channels, is the preferred channel.

Western Channel, the principal channel leading through Serpents Mouth, has depths of 11 to 22m in its central part, but is bordered by unmarked shoals on both sides of the fairway.

The central part of the gulf has depths of 18 to 37m, but its W part is shoal. The approaches to most of the ports and terminals have depths of less than 18m.

Tides—Currents.—A branch of the South Equatorial Current and the fresh water discharged from the tributaries of the Rio Orinoco enter the gulf through Serpents Mouth and control the general water movement within the gulf. During the flood season of the Rio Orinoco (May to October), fresh water flows in abundance into the gulf from these tributaries. It dilutes the sea making the surface water almost fresh and directs the currents toward the northernmost entrance.

Rates of 2 to 3 knots have been observed in March and April. During the rainy season, the strength of the current is probably greater by reason of the increased outflow from the Orinoco system. Off the Venezuelan coast from Punta Baja, the current sets W at a rate of 1 to 2 knots with no appreciable tidal effect.

Off Punta de Arenal, the surface currents set constantly NW at a rate of 1 to 3 knots and slacken at about the time of LW. A strong SE undercurrent has been observed to set below a depth of 9m. At the same time a SW current of yellowish muddy water, in contrast with the usual olive-green NW current, makes its appearance off Corral Point and passes S round the point, sometimes reaching as far as Wolf Rock. Vessels lying at anchor off Corral Point usually swing with their bows to the N until 2 to 3 hours after LW.

In Middle Channel, about halfway between Punta del Arenal and Soldado Rock, the currents set NW at 1.5 knots and the tidal currents NE and SW at 0.8 knot. The NE currents run for about 5 hours after the time of HW at Georgetown, Guiana.

To the NE of a line extending NW from Punta del Arenal, the currents are affected by the tides, both in direction and strength, and are irregular until NE of Los Gallos Point. To the NE of Los Gallos Point, the currents have been observed to be tidal with rates of 0.5 knot to 1.5 knots. The ebb current sets NE for 9 hours after HW, and the flood SW for 3 hours before HW. Later observations give the same rates, but with the currents running for 6 hours after HW and LW, respectively.

In Western Channel, the NW currents attain rates of 3 to 4 knots over the shoals on the SW side of the channel.

The general current circulation within the gulf is N, emerging through Dragons Mouth. During the period of influx of fresh water from the Orinoco system, a compensating saline undercurrent enters through the Dragons Mouth setting S and SW. However, during the dry season, both the surface and undercurrents are directed N when the influx of fresh water decreases and the incoming saline undercurrent almost disappears.

Between Port of Spain and Brighton outside the 20m curve, the tidal currents are not well defined. During July and August, a SW current was observed running continuously for several days. At other times little or no current was observed in either direction. In the dry season (November to June), the tidal currents set S on the flood and N on the ebb. From June to November, the tidal currents are irregular, sometimes being reversed in direction, setting N or S continuously for days. At other times there is little or no current. These variations apparently depend upon the influx of the river systems, but cannot be predicted with any certainty.

On the E side of the gulf, the tidal currents from Dragons Mouth and Serpents Mouth meet just E of Brighton, but they are irregular. Between Brighton and Cedros Point in June and July, the currents setting SW and NE were observed to be stronger at neaps than at springs. Off Guapo Bay, these currents attain rates of 1 to 2 knots.

In the W part of the gulf, the tidal currents set between W and SW on the flood and between E and NE on the ebb.

Additional current data is given with the port information.

Off the northernmost entrance of the gulf, the N and NW tidal currents attain rates of 2 to 3 knots according to the season and the strength of the current and water levels of the Orinoco system. Between July and October, the influence may be felt 15 to 20 miles offshore. The water in the gulf for several miles outside this entrance has a muddy appearance, and in October the water becomes reddish in color.

The opposing tidal and ocean currents produce strong ripples, which from aloft may be seen extending in long curved lines for several miles outside the gulf, gradually approaching the entrance as the S flood increases its strength. In the entrance, these ripples often become a race, dangerous to boats.

In Boca Grande from July to October, the S tidal current runs for 4 hours at springs, but its rate seldom exceeds 0.5 knot as the N ocean current is then at its maximum strength, augmented by the influx of the swollen Orinoco system. During this period, the N tidal currents, accelerated by the ocean currents, run for 8 hours at a rate of 2 to 3 knots. From November to June, the tidal currents have more effect as the ocean current is then reduced, but they are at times variable due to various river levels. Strong rips occur in Boca Grande in the area of Isla Patos.

In Boca de Navios, the S flood current seldom exceeds 1 knot. The N ebb, accelerated by ocean currents, attains rates of 2.5 to 3.5 knots.

In Boca de Huevos, the N ocean currents are seldom offset by the S flood currents, except on the E side of Huevos Island. The ebb current attains a rate of 3 to 4 knots, and even as much as 5 knots in the rainy season.

In Boca de Monos, there is no S current during the flood. Rates of 2 to 3 knots are attained during the N ebb current.

Pilotage.—Pilotage is compulsory for all ports and terminals on the W coast of Trinidad within the Gulf of Paria. This

includes Chaguaramas Bay, Saint Peter's Bay, Grier Channel and basin at Port of Spain, the oil jetty at Pointe-a-Pierre, La Brea Pier, Brighton Pier, and Point Fortin Oil Pier.

Pilots from Port of Spain will, if required, board vessels outside of the above port areas, including Dragons Mouth, provided prior notice has been sent by radio.

Pilotage is compulsory for vessels proceeding to the Venezuelan river ports and pilots must be embarked at Guiria.

Additional pilotage information is given with each port description.

Caution.—Oil wells and drilling platforms form a serious hazard to navigation within the gulf. Some platforms are moved frequently and Notice to Mariners should be consulted.

Extreme care is advised when navigating within the gulf as the newly erected platforms may not be charted. Vessels should make every effort to obtain the latest corrected charts of the area prior to entry.

Dragons Mouth

1.19 Dragons Mouth (10°42'N., 61°45'W.), the N entrance to the Gulf of Paria, is formed between Entrada Point, the NW extremity of Trinidad, and Punta Penas, the NE extremity of Venezuela.

Dragons Mouth is divided into four channels by three islands which, from E to W, are Monos Island, Huevos Island, and Chacachacare Island.

Boca de Monos (10°42'N., 61°40'W.) is formed between Trinidad and Monos Island, 0.5 mile W. The island is thickly wooded and 287m high. The fairway channel of Boca de Monos is about 0.2 mile wide. Strong and irregular eddies occur off the points and this passage is not recommended.

Le Chapeau, marked by a light, lies 0.1 mile NE of Monos Island, on the W side of the N entrance to Boca de Monos. A spit, with a depth of less than 1.2m, extends up to about 0.1 mile SE from the SE extremity of Monos Island.

Caution.—A dumping ground for explosives, which may best be seen on the chart, lies centered 3.5 miles E of Punta Penas.

Boca de Huevos (10°41'N., 61°42'W.) is about 0.8 mile wide and deep. This channel separates Monos Island from Huevos Island, which is the smallest and central of the islands forming Dragons Mouth.

Huevos Island is divided into two parts by Boca Sin Entrada and joined near its center by a narrow neck of drying sand. A rock, 27m high, lies close off the NE extremity of Huevos and foul ground, with depths of less than 1.8m, extends up to about 0.1 mile E of its E extremity. A light is shown from the S extremity of the island.

Chacachacare Island (10°41'N., 61°45'W.), thickly wooded, is connected near its center by a low isthmus. Boca de Navios, a deep and clear channel, is about 0.8 mile wide and leads between the S extremity of Huevos Island and the E extremity of Chacachacare Island.

The NE side of Chacachacare Island between La Lue Point and Point Girod, 1.8 miles SE, rises abruptly to heights of 183 to 240m. Point Girod is composed of prominent, red cliffs. The SW extremity of the island terminates in a perpendicular cliff, 126m high.

1.20 Diamond Rock (10°40'N., 61°46'W.), composed of coral, lies about 0.3 mile W of the SW extremity of Chacachacare Island and a lighted buoy is moored close W of it. This buoy was reported (1997) to be missing. The rock is steep-to and has a least depth of 1.8m. The other dangers that fringe the coasts of the island lie no more than 0.1 mile offshore.

Chacachacare Bay, on the E side of the island, is entered between Point Girod and Point Romain, 0.8 mile SW. Vessels may anchor, in depths of 24 to 29m, mud, within the bay. Vessels approaching this anchorage from the S should favor Point Romain until within the bay as a strong current sets NE across the entrance.

Boca Grande (10°42'N., 61°48'W.), the principal channel leading into the Gulf of Paria, is about 5.8 miles wide between the NW extremity of Chacachacare Island and Punta Penas. In general, the depths in the channel are over 16m. However, a shoal, with a least depth of 14.3m, lies near the middle of the channel, 2.8 miles W of Chacachacare Island.

Promontorio de Paria, rising on the W side of the Dragons Mouth, is 299m high and appears as an island from a distance to the NW or SE. La Islette, a small islet, is 70m high and lies close N of the N extremity of the promontory. A rock, awash, lies about 0.3 mile NE of Punta Penas and tide rips form in its vicinity.

Punta Cerezo, 134m high, is located on the Venezuelan coast, 2.5 miles SSW of Punta Penas.

Caution.—A dumping ground area, which may best be seen on the chart, has been established for both wrecks and explosives off the SE coast of Chacachacare Island.

1.21 Garza Rocks (10°41'N., 61°53'W.) lie close together 0.3 mile offshore, about 0.8 mile SSW of Punta Cerezo. The largest rock in this group is 66m high.

From close W of Garza Rocks, the coast extends 1 mile SSW to Punta Garcitas, which rises to a height of 342m about 0.5 mile N. Several red cliffs stand between Punta Penas and Punta Garcitas.

Isla Patos (10°38'N., 61°52'W.), a thickly-wooded islet, lies 2.5 miles SSE of Punta Garcitas. This islet is 100m high and marked by a light. A racon is situated at the light structure. A flagstaff surmounts a summit in the W part of the islet.

Strong tide rips are usually encountered about 0.5 mile S of the SE extremity of the islet and about 2 miles NE of the same extremity.

Caution.—Several oil platforms are situated 13 miles S of Isla Patos. Due to the many obstructions, wells, rigs, and submerged pipelines in the vicinity, vessels are advised to avoid the area whenever possible.

Deep-draft vessels entering Boca Grande should transit in the designated area as indicated on the chart.

Serpents Mouth

1.22 Serpents Mouth, the S entrance to the Gulf of Paria, is approached between the S coast of Trinidad and the shoals extending about 4 miles off the coast of Venezuela.

Icacos Point (10°04'N., 61°54'W.), the SW extremity of Trinidad, is low, flat, and forms the N entrance point of

Icacos Point from W

Serpents Mouth from SE

Serpents Mouth. Punta del Arenal is the SW extremity of this point and Corral Point is located 1 mile N of it.

Serpents Mouth, though not as safe as Dragons Mouth, is accessible by day to vessels of moderate size and draft. Vessels proceeding from Port of Spain to Demerara will shorten the time taken for the passage by avoiding much of the adverse current encountered when taking the usual route around the N and E sides of Trinidad, although the distance is about the same. At night, this passage through Serpents Mouth can be dangerous. The currents are strong and variable, and must be avoided, particularly during the rainy season, between the middle of April and the middle of October. Continuous monitoring of the vessel's position is absolutely necessary.

1.23 Green Hill (10˚04'N.,61˚52'W.),65m high, is located 4.3 miles ENE of Punta del Arenal; a beacon, 34m high, stands close NE of it. This hill and the beacon are conspicuous when approaching Serpents Mouth from the E.

From Punta del Arenal, the coast of Icacos Point extends 1 mile N to Corral Point and then 1.8 miles NE to Los Gallos Point. The latter point is yellow, cliffy, and 18m high. The coast between Corral Point and Los Gallos Point is fringed by a bank, with depths of less than 5.5m which extends up to about 0.8 mile offshore. During N winds, the sea breaks a considerable distance offshore in this area.

Los Gallos Rocks, up to 15m high, extend up to about 0.2 mile W from the point and are marked by a lighted buoy moored 1 mile W.

A bank, with depths of less than 20m, extends up to about 6.8 miles W from Punta del Arenal. A number of above-water rocks and shoal patches, with depths of less than 5m, lie within the limits of this bank.

Soldado Rock (10˚04'N., 62˚01'W.), 36m high, lies on the bank, about 5.3 miles WNW of Corral Point. It is marked by a light and appears like a sail from a distance. Pelican Rocks and Southeast Rocks, similar groups about 2m high, lie 1 mile S and 0.8 mile SSE, respectively, of Soldado Rock.

A detached shoal, with a least depth of 4.7m, lies on the SW side of Western Channel, 3.4 miles WSW of Pelican Rocks.

Southeast Ledge, an isolated shoal with a least depth of 3.7m, lies about 2 miles SE of Soldado Rock.

Three Fathom Bank (10˚03'N., 61˚57'W.), with a least depth of 3.4m, lies 0.3 mile W of Corral Point. Wolf Rock, with a depth of 1.2m, lies 0.4 mile NW of Punta del Arenal Light and Demerara Shoal, with a depth of 4.6m, lies 1 mile N of it.

An isolated patch, with a depth of 3.4m, lies about 0.5 mile NW of Demerara Shoal. The positions of other shoal patches within the Three Fathom Bank area may best be seen on the chart.

Access to the Gulf of Paria from Serpents Mouth may be made through Eastern Channel, Second Channel, Middle Channel, or Western Channel described below. Vessels other than those of shallow draft should avoid the shoal, with a depth of 7.3m, lying 5.5 miles SW of Erin Point. A dangerous wreck lies 1.8 miles SE of Punta del Arenal Light and should also be avoided.

1.24 Eastern Channel (10˚02'N., 61˚56'W.), entered between Punta del Arenal and Wolf Rock, has a least depth of 6.1m.

Second Channel, lying between Wolf Rock and Three Fathom Bank, leads either E or W of Demerara Shoal. This channel has a least depth of 7m in its entrance, but vessels with drafts of up to 7.6m can transit through it.

Middle Channel leads between Three Fathom Bank and the shoals lying SE of Soldado Rock. This channel has a least depth of 5.8m, but vessels with drafts of up to 7.9m can make the transit.

Western Channel leads between the shoal patches lying SW of Pelican Rocks and the shoals fronting the coast of Venezuela. This channel is wide and deep, but it must be used with caution as the NW currents run at rates of 3 to 4 knots, at times, over the dangerous patches on its SW side.

Directions.—Approaching Serpents Mouth from the E, the S coast of Trinidad should be favored to avoid the incompletely surveyed coast of Venezuela, where uncharted dangers may exist.

Having passed Galeota Point, vessels should keep about 3 miles off the coast of Trinidad and in depths of 18 to 27m until SW of Erin Point, where depths on the N side of the fairway decrease to 9 to 11m.

Eastern Channel should be entered by rounding Punta del Arenal at a distance of 0.2 mile, passing midway between the point and Wolf Rock, and then passing E of Demerara Shoal.

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Punta del Arenal should not be brought to bear more than 166° until vessels have cleared the 5m curve, W of Icacos Point. This channel is narrow and may be partially obstructed by vessels at anchor.

1.25 Middle Channel is the one most generally used for vessels with suitable draft. After rounding Punta del Arenal at a distance of 0.5 to 1 mile, vessels should steer for Soldado Rock until Cedros Point is in line with the outermost of the Los Gallos Rocks, bearing 061°. Then, allowing for the current, vessels should steer to make good a course of about 342°. They should proceed, passing midway between the lighted buoy marking Three Fathom Bank and the lighted buoy moored 1.3 miles WNW, until clear of all dangers to the N of Soldado Rock.

Vessels of light draft with local knowledge may, in fair weather, cross the outer part of the bank, with depths of less than 9m, lying NW of Icacos Point when Los Gallos Rocks bear more than 090°.

Anchorage.—Good anchorage can be taken between Icacos Point and Soldado Rock in convenient depths. The only place smooth water can be depended upon, if there is wind, is under the lee of Icacos Point, between Punta del Arenal and Corral Point.

Caution.—Soldado Marine Oil Field lies NE of the termination of the above directions. Navigation is restricted within the limits of this oil field and vessels are advised not to approach within the area bound by Lighted Buoy A through Lighted Buoy E.

It was reported (1997) that Lighted Buoy A through Lighted Buoy E were missing. Numerous other buoys marking dangers in this area were also reported (1997) to be missing.

Trinidad—West Coast—Entrada Point to Port of Spain

1.26 From Entrada Point, the W coast of Trinidad trends 1.8 miles S to Punta Delgado and forms the E side of Boca de Monos.

From **Punta Delgado** (10°41'N., 61°40'W.), the coast trends 2 miles E to Point Gourde and then continues 6 miles E to Port of Spain. Point Gourde is formed by a peninsula, 141m high.

Teteron Rock, which dries 0.9m, lies close W of Punta Delgado and is marked by a light.

Gasparillo Islet (10°40'N., 61°39'W.), 42m high and marked by a light on its SW extremity, lies close S of San Jose Point, 0.8 miles SE of Punta Delgado. A shoal, with a depth of 8.8m, lies about 0.2 mile ENE of this islet.

Gaspar Grande Island, 103m high, lies 0.5 mile S of Gasparillo Islet; its W end is located 1 mile S of Punta Delgado. Scorpion Ledge, with a depth of 3m over its extremity, extends up to about 0.2 mile seaward from the SE side of the island. The channel leading between Gasparillo Islet and Gaspar Grande Island has depths of 31 to 48m. The channel lying E of the island has depths of 31 to 37m and is clear, except for Scorpion Ledge. Lights are displayed at Epsolon Point, near the SW extremity of the island, and at Reyna Point, the NW extremity.

Chaguaramas Bay (10°41'N., 61°39'W.)

World Port Index No. 11710

1.27 Chaguaramas Bay is entered between San Jose Point and San Carlos Point, 1.3 miles SE. The port area consists of a coastal natural harbor which is protected on the E side by Point Gourde. A bauxite terminal is situated on the E side of the bay and naval facilities stand on the N side of the bay.

Tides—Currents.—The flood current flows through Boca de Monos, E around Punta Delgado, and then between Gaspar Grande Island and the coast of Trinidad. The current strikes the W side of Point Gourde and is deflected Pier No. 4 and Pier No. 5, and in the bay to the W of them. This portion of the current is weak and confined to an area close to the shore. The ebb current flows W between Gaspar Grande Island and Trinidad, and then N through Boca de Monos. Eddies are caused in the bay to the W of Pier No. 4 and Pier No. 5, as a portion of the current is deflected N by Gasparillo Islet. As this current weakens and the S current builds up at the N end of Boca de Monos, a tidal surge, known locally as the Re-Mou, sometimes occurs. It moves E through the channel N of Gaspar Grande Island and is clearly visible as a marked line on the surface.

The Re-Mou arrives in Chaguaramas Bay between 30 minutes and 1 hour after local LW and runs for 20 to 30 minutes. It is irregular in occurrence and erratic in rate, varying between 1 and 5 knots. In general, the surge is strongest in July and August and weakest in January through March, though maximum rates can occur at any season. As soon as the Re-Mou has dissipated, the tidal current settles to its normal rate.

Depths—Limitations.—The Main Wharf, 275m long, provides two berths and has a depth of 10.6m alongside. Berthing and unberthing should be avoided between LW and 1 hour 30 minutes after LW.

The North Wharf, 122m long, has a depth of 7.6m alongside.

Vessels of up to 164,540 dwt and 295m in length can be accommodated in the port.

A floating repair dock for vessels of up to 11,000 dwt and 170m in length is available.

Pilotage.—Pilotage is compulsory for vessels using the piers or wharves. Pilots can be contacted by VHF and board about 1 mile S of Cronstadt Islet. Vessels should send a request for pilotage and an ETA 72 hours, 48 hours, and 24 hours in advance.

Anchorage.—Authorized vessels can anchor, in a depth of 26m, about 0.5 mile N of the E extremity of Gaspar Grande Island. However, this berth is not advisable due to strong currents. In addition, numerous other vessels are generally anchored in the vicinity. The safest and best anchorage for vessels awaiting repairs is located about 1.5 miles S of Cronstadt Islet.

1.28 **Diego Islands** (10°39'N., 61°38'W.), consisting of Cronstadt Islet and Carrera Islet, lie 0.4 mile S of Point Gourde. Some prominent buildings stand on both islets.

Depths—Limitations.—A quay, 61m long, fronts the W side of Cronstadt Islet and has a depth of 13.7m alongside. Vessels of up to 122m in length can berth at this quay by overhanging each end.

A penal colony is situated on Carrera Islet.

The intervening channel leading between the islets and Point Gourde is deep and clear of dangers.

Pilotage.—Pilotage is compulsory to the quay and berthing is carried out during daylight only. The pilot usually boards about 0.5 mile SW of the pier head.

Caution.—Submarine cables connect Carrera Islet, Cronstat Islet and Point Gourde.

1.29 Five Islands (Las Cotorras) (Quarantine Islands) (10°39'N., 61°36'W.) are in reality six islets. However, Craig Islet, the smallest, is joined to Caledonia Islet, the largest, by a narrow drying reef. This group lies 1.3 miles E of Carrera Islet on two detached shoals, with depths of less than 5m. Caledonia Islet, the N, is 25m high, and Nelson Islet, the S, is 11m high. Buildings stand on all these islets except one.

Carenage Bay (10°41'N., 61°36'W.) lies between Alice Point, the E extremity of Point Gourde, and Point Sinet, located on the mainland 1 mile ENE. An extensive shoal, with depths of 2.1 to 5.5m, lies with its SW extremity located 0.4 mile NE of Alice Point.

Depths—Limitations.—Pier No. 1 has collapsed and constitutes an obstruction to navigation. Pier No. 2 is in ruins and its range marks have been discontinued.

A bauxite plant stands close E of Point Sinet; a pier projects S from the shore in its vicinity. It is 297m long on the W side and 206m long on the E side. The berth on the W side is for loading and the berth on the E side is for discharging. Vessels of up to 35,000 dwt and 7m draft can be accommodated.

A lighted range, bearing 042°14', indicates the channel, dredged to a depth of 11m, leading to the berths. A conspicuous tank stands 0.1 mile NNW of the rear range structure.

Caution.—A submarine cable extends E, parallel to the shore, and crosses under the pier close to its head.

At times, the range lights may be difficult to distinguish because of thick bauxite dust.

Martin Point (10°40'N., 61°34'W.), located 2.3 miles ESE of the bauxite plant, lies at the W limit of Port of Spain. A bay lies between Martin Point and the mouth of the Maraval River.

Port of Spain (10°39'N., 61°31'W.)

World Port Index No. 11720

1.30 Port of Spain is a natural coastal port situated in the NE corner of the Gulf of Paria. It is the principal port for vessels in Trinidad and one of the most important ports in the West Indies. Ample berthing spaces are provided for all classes of vessels.

The city is the capital and the seat of Government of Trinidad and Tobago.

Winds—Weather.—The prevailing winds are from the E; however, strong W winds accompanied by rough seas may occur without warning from July to October. The E winds overcome the effect of the tidal currents and the current setting out of the Rio Caroni, so that vessels in the roadstead usually lie heading E.

Tides—Currents.—The tides rise 1.2m at springs and 0.9m at neaps.

The flood tidal current sets SE at a rate of 0.5 knot and the ebb current sets in the reverse direction at the same rate. About 4 miles SW of the harbor area, the currents have been found to be irregular and of considerable strength.

Depths—Limitations.—The city and the harbor area are fronted by a shore bank with depths of less than 5m.

Grier Channel, 165m wide, has a least depth of 9.8m and leads through the shore bank to a basin fronting Kings Wharf and Kings Wharf extension. This basin has general depths of 9.5 to 10.2m.

There are eight berths, numbered 1 through 8 from SE to NW. Kings Wharf, which contains Berth No. 1 through Berth No. 6, is 0.6 mile long and has depths of 8 to 9.8m alongside. It is used by general cargo vessels and cruise ships.

Berth No. 6 and Berth No. 6A form a container terminal. It is 0.2 mile long and has depths of 9.5 to 10m alongside.

Kings Wharf extension, which contains Berth No. 7 and Berth No. 8, is 0.2 mile long and has a depth of 9.5m alongside. Berth No. 7 is unused. Berth No. 8 is used by breakbulk and ro-ro vessels. Berth No. 8A is used by vessels carrying rice.

Sea Lots Channel, 80m wide, has a least depth of 6.7m. It lies 1 mile SE of, and parallel to, Grier Channel. This channel leads to a dredged basin. Several finger piers, with alongside depths of 1.8 to 4.5m, project S from the N side of this basin.

Vessels of up to 9.7m draft can be accommodated. There is no restriction for length.

Aspect.—The city is built on the shore at the S extremity of a flat plain, at the base of the Saint Ann Mountains. These mountains, up to 620m high, stand 3 miles NE of the city. The Laventille Hills stand 0.5 mile E of the center of the city. A conspicuous church is situated 0.5 mile S of these hills and Fort Picton stands 0.2 mile SSW of it.

Other conspicuous landmarks include the radio towers situated close N of Saint Vincent Jetty, the chimneys standing about 0.7 mile NW of the same jetty, and the Fort George signal station situated NW of the town.

Grier Channel is indicated by a lighted range and marked by lighted buoys. Sea Lots Channel is marked by lighted beacons and indicated by a lighted range.

Several mooring buoys are situated about 0.5 mile SSW of Saint Vincent jetty.

Pilotage.—Pilotage is compulsory from 0.5 mile seaward of the dredged channel to the berths. Vessels should send an ETA 48 hours and 24 hours in advance through North Post Coast Radio Station. Pilots can be contacted by VHF channels 12, 16 and board about 0.5 mile seaward of the entrance to Grier Channel. Pilots for Sea Lots Channel board about 0.1 mile W of the entrance lighted beacons.

Anchorage.—Vessels may anchor as convenient, in depths of 5.5 to 11m, stiff mud, anywhere off the city. Vessels should not anchor within 0.1 mile of the center lines of the channels to avoid obscuring the lighted buoys and beacons. In addition, vessels should not anchor within 0.5 mile of the channel entrances.

Caution.—The Grier Channel range lights are often obscured by smoke.

Several wrecks and submerged obstructions, which may best be seen on the chart, lie in the basin and in the vicinity of the channels.

An explosives anchorage area, the limits of which are indicated on the chart, lies close S of the entrance to Sea Lots Channel. Several stranded wrecks and obstructions, some with depths of as little as 3.8m, lie within this explosives anchorage and may best be seen on the chart.

A spoil ground area, with a least depth of 4.2m, lies close N of Grier Channel. Vessels with drafts of more than 3m are advised not to navigate through this area.

Port of Spain to San Fernando

1.31 The coast between Port of Spain and **Cangrejos Point** (10°26'N., 61°30'W.), 13.5 miles S, is low and swampy. It is fronted by a mud flat, with depths of less than 5m, which extends up to 2 miles offshore. Three shallow rivers, which drain the swampy land, discharge within 7 miles S of Port of Spain. Barrancones Point, located 8.5 miles SSE of Port of Spain, is low, but a conspicuous chimney stands 1.8 miles S of it. About 1.5 miles N of Cangrejos Point, a few small cliffs may be seen through the mangroves.

Cangrejos Point is not easily identified, but two conspicuous white chimneys stand 2.5 miles ESE of it. Another group of chimneys stands about 0.5 mile S of the two white chimneys.

Savonetta Point (10°25'N., 61°30'W.) is located 1 mile S of Cangrejos Point. It is reported that vessels load sugar from lighters off this point.

Lisas Bay is entered between Savonetta Point and Lisas Point (10°23'N., 61°29'W.), 2 miles S. This bay is fringed by a drying bank extending up to about 0.5 mile offshore. Depths of 5.5m lie up to 1.5 miles W of Lisas Point.

Claxton Bay, a shallow indentation, is formed between Lisas Point and Pointe-a-Pierre, 3.3 miles SSE.

Caution.—An oil production platform is situated about 5 miles NW of Cangrejos Point.

1.32 **Point Lisas Industrial Port** (10°24'N., 61°30'W.) (World Port Index No. 11750) is divided into three operational areas. Specialized bulk cargo is handled at the NW section of the port area. In addition, there are facilities for ammonia, urea, methanol, and base oil products. The third operational area comprises docking for container, ro-ro, and general cargo vessels.

Depths—Limitations.—Savonetta Channel, which leads for 2 miles through the shore bank to a turning basin, is 152m wide and dredged to a depth of 12.8m. The turning basin is also dredged to a depth of 12.8m.

A jetty, with a dolphin at its SE end, is situated on the NE side of the basin and provides a bulk cargo berth for the steel works. A small jetty used by tugs is situated in the N corner of the basin.

Savonetta Pier No. 1 North is 115m long and can accommodate vessels of up to 7m draft. Bulk lube oil and additives are handled at this berth.

Savonetta Pier No. 1 South is 310m long and can accommodate vessels of up to 220m in length and 11.6m draft. Anhydrous ammonia, urea, and methanol are handled at this berth.

Savonetta Pier No. 2 is 312m long and can accommodate vessels of up to 42,000 dwt, 180m in length, and 11.6m draft.

Savonetta Pier No. 3 is 500m long and can accommodate vessels of up to 245m in length and 11.6m draft.

The iron carbide dock is 407m in length and can handle vessels of up to 245m in length and 11.6m draft.

The container and ro-ro berths can handle vessels of up to 170m in length and 7.8m draft.

Berth No. 1 is 35m long and can accommodate vessels of up to 25m in length and 6.0m draft.

Berth No. 1A is 30m long and can accommodate vessels of up to 100m in length and 5.0m draft.

Berth No. 2 is 165m long and can handle vessels of up to 70m in length and 4.5m draft.

Berth No. 3 can accommodate vessels of up to 105m in length and 6.5m draft.

Berth No. 4 is 110m long and can accommodate vessels of up to 170m in length and 7.8m draft.

Vessels of up to 75,000 dwt, 243m in length, and 11.6m draft can be accommodated at the port at LW, allowing for a 10 percent underkeel clearance.

Aspect.—A lighted range, bearing 052°16', indicates the channel leading through the shore bank to the turning basin.

A prominent steel plant stands about 0.3 mile inland from the port.

Pilotage.—Pilotage is compulsory. Pilots can be contacted by VHF and board about 1 mile W of the entrance to the dredged channel. Vessels should send an ETA together with a request for pilot 5 days, 4 days, 3 days, 48 hours, 24 hours, and 12 hours prior to arrival.

Anchorage.—Anchorage areas for inbound and outbound vessels are situated NW of the channel entrance. When the port is congested, vessels may be requested to anchor at Port of Spain Roadstead before proceeding to Point Lisas Industrial Port.

1.33 **Lisas Point Port** (10°23'N., 61°29'W.) is located S of Point Lisas Industrial Port and should not be confused with the latter. This is a Hydro-Agri port formerly known as Fedchem, Point Lisa.

Depths—Limitations.—The port is entered through a 250m wide approach channel using lighted beacons in line 091°20' as lead marks. The channel is dredged to 12.8m up to the Tringen deep water terminal and turning basin. Thereafter the channel is dredged to 8.8m to the inner berths and turning basin.

Tringen II provides berths for loading ammonia on the N side of the entrance to the inner channel and Hydro-Agri Turning Basin. The terminal can accomodate vessels of 220m length and 11.6m draft.

Jetty No. 1 in the inner harbor on the N side can accomodate vessels of 170m length and 8.7m draft. This berth is for loading butane and natural gas.

Jetty No. 2 in the inner harbor on the foreshore can accomodate vessels of 171m overall length and 8.7m draft. This berth handles ammonia, molassas, bulk sugar, sulphuric acid, caustic soda, and voranol.

Pilotage.—Pilotage is compulsory. Vessels should send their ETA 48 hours, 24 hours, and 12 hours in advance of arrival. Pilots board at the entrance to the Lisas Point approach channel.

Anchorage.—Anchorage areas for inbound and outbound vessels is found as charted S of the entrance channel.

1.34 Claxton Bay Marine Terminal (10°21'N., 61°28'W.) is situated 1.5 miles N of Pointe-a-Pierre and is used for loading cement. The terminal is approached through a channel dredged to a depth of 6.4m (1985). This channel is marked by lighted beacons and leads to a turning basin. A lighted range, bearing 081°25', indicates the fairway leading to a loading pier and a ro-ro berth, at the E end of the basin. It is reported that pilots for this terminal can be embarked at Lisas Point Port.

Caution.—From a point on the shore located 0.2 mile S of the rear range light, a disused submarine pipeline, which may best be seen on the chart, extends about 1 mile seaward and parallels the dredged channel.

Pointe-a-Pierre (10°19'N., 61°28'W.)

World Port Index No. 11730

1.35 Pointe-a-Pierre is an open roadstead, with several berths and terminals for tankers.

Winds—Weather.—From January to March, NE or E by NE winds predominate. They are at their strongest, averaging 12 to 15 knots. From August to October, the winds, although variable, are mainly E or SE and are at their weakest, averaging 7 to 8 knots. In other months, the winds tend to be intermediate both in direction and force between the values quoted for spring and autumn.

Squalls of varying intensity are common during the seasonal torrential rains from June to October. These rain squalls are often accompanied by sudden shifts in wind direction.

The hurricane season is from the beginning of August to mid-September, but they may occur as early as June or as late as November. It is unusual for the coasts of Trinidad to be directly affected by these hurricanes, although, they may experience heavy swells and sometimes rough seas when a hurricane crosses to the N of the island.

Tides—Currents.—Off the pipeline jetty, both the N and S tidal currents attain rates of 0.5 to 1 knot. Outside the 20m curve, the tidal currents are not well defined. During the months of July and August, a SW current was observed running continuously for several days, while at other times there was little or no current either way.

The tidal currents between November and June set S on the flood and N on the ebb, with rates of 0.5 to 1 knot. Between June and November, the tidal currents are irregular and may set N or S for several days with rates considerably in excess of the average on occasions, but at certain times they are nonexistent.

Depths—Limitations.—The berthing facilities consist of two jetties and three offshore island berths, connected by pipeline with the S jetty, which extends from the shore. All of these facilities are served by several oil terminals and can accommodate a number of tankers simultaneously.

The main, or N jetty, is about 0.5 mile long and extends WNW from the shore. The S jetty, a viaduct supported on piles, has dolphin-type Berth No. 1 through Berth No. 4 on its N side and Berth No. 2S on its S side. The main channel has a controlling depth of 12.4m.

The berthing limitations are, as follows:

Berth No.	Length	Draft	Size
1	219m	11.4m	50,000 dwt
2N	236m	11.3m	63,000 dwt
2S	122m	6.7m	7,000 dwt
3N	195m	10.7m	35,000 dwt
3S	107m	6.1m	3,000 dwt
4	107m	7.0m	5,000 dwt
5	274m	12.6m	100,000 dwt
6N	289m	15.5m	120,000 dwt
6S	289m	15.5m	120,000 dwt
7	213m	9.1m	35,000 dwt
8	173m	6.0m	25,000 dwt

An SPM is moored 3.3 miles WNW of the N jetty in a depth of 24m. It can accommodate vessels of up to 285,000 dwt and 22.4m draft.

Aspect.—Naparima Hill, 177m high, rises 2.5 miles S of the root of the N jetty at Pointe-a-Pierre and is conspicuous. A conspicuous water tank stands about 0.5 mile ENE of Pointe-a-Pierre. Three chimneys, each 81m high, stand 1 mile SE of the water tank; a similar chimney, 80m high, is situated 1 mile WSW of them.

The hills which extend NE from Pointe-a-Pierre have been reported to be radar conspicuous.

The oil terminals are not clearly visible from a distance, but the landmarks may be useful.

Pilotage.—Pilotage is compulsory within 0.5 mile seaward of the oil installation at Pointe-a-Pierre and for all berthing and unberthing, including passage to the SPM.

Vessels using the berths embark pilots about 1.4 miles SE of the SPM. Vessels should send an ETA 72 hours, 48 hours, and 24 hours in advance. If the ETA changes by more than 2 hours, an amended ETA message should be sent immediately. Vessels should contact the terminal on VHF channel 16 at least 2 hours before arrival. Tugs are required for berthing and unberthing.

Vessels proceeding to the SPM usually embark pilots about 2 miles W of it. Vessels must keep their engines at immediate readiness while at the buoy. The emergency signal to stop pumping is a continuous blast on the whistle.

Anchorage.—An anchorage, restricted to vessels of 200,000 dwt or more and for ship to ship transfer operations, lies 1.5 miles SSW of the SPM.

Other vessels should anchor at least 1 mile E of the above anchorage. Transshipment anchorages, which may best be seen on the chart, have been established 4 miles W of the head of the viaduct.

Caution.—Vessels are prohibited from anchoring within 1 mile of the SPM or within 0.3 mile of the pipelines, as indicated on the chart. In addition, vessels are forbidden to cross any of the submarine pipelines lying off Pointe-a-Pierre.

Vessels in the vicinity of Pointe-a-Pierre are requested not to use VHF channels 6 and 10, which are used for transshipment operations.

1.36 San Fernando (10°17'N., 61°28'W.) (World Port Index No. 11740) stands on the coast, 2.5 miles S of Pointe-a-Pierre. It can be easily identified by Naparima Hill, which rises close E, and Mon Chagrin, 85m high, which stands 0.4 mile E.

The port is used by small coasters. A pier, 122m long, extends from the shore abreast the town and has a depth of 1.8m alongside. An approach channel leads to the pier and has a least depth of 1.8m. It was reported (1986) that the channel was disused and the buoys removed.

Hughes Rock (10° 17'N., 61° 30'W.), with a depth of 1.2m, lies 1.8 miles WSW of the head of the pier. Farallon Rock, 4.6m high, lies 0.3 miles SW of the pier. A wooden building and a flagstaff stand on this rock.

A drying reef, with the remains of several piles about 0.6m high on it, lies close off Bontour Point, about 0.5 mile S of the head of the pier.

Anchorage.—Anchorage can be taken, in depths of 7 to 13m, between 1.3 miles and 2 miles from the head of the pier with the summit of Naparima Hill bearing 107°.

San Fernando to Cedros Point

1.37 The coast between San Fernando and Pitch Point (10° 15'N., 61° 37'W.), 9 miles WSW, is bordered by Oropuche Bank. This bank has depths of less than 5m and extends up to 3 miles offshore. A conspicuous white shed stands on the shore, about 3 miles SW of San Fernando.

Pitch Shoal, a small patch with a least depth of 7m, lies close off the NE side of Oropuche Bank, 1 mile WSW of Hughes Rock.

Brighton (10° 15'N., 61° 38'W.) (World Port Index No. 11760) is a natural coastal harbor. It consists of the piers at La Brea, situated E of Pitch Point, and the pier and facilities at Brighton, on the W side of Pitch Point.

Tides—Currents.—The tidal currents off the pier at Brighton are strong. The SW current attains a rate of 1.5 to 2.5 knots and the NE current attains a rate of 1 to 1.5 knots. The tidal currents from Dragons Mouth and Serpents Mouth meet just E of Brighton, but they are irregular.

Depths—Limitations.—The pier at La Brea extends N from a point located 0.2 mile SE of Pitch Point. It is 0.4 mile long, but reported (1985) to be disused and unsafe. A mooring buoy is situated 0.1 mile NW of the pier head.

Two mooring buoys are situated about 0.5 mile NNE of Pointe d' Or and a submarine pipeline extends about 0.3 mile NNW from the former pier to the 10m contour.

Brighton Pier extends 0.2 mile NNW from the shore abreast of Brighton. The head of this pier lies in an area dredged to a depth of 10.1m. The E side of the pier has depths of 6.6 to 9m and the W side has depths of 6.6 to 7.5m. It was reported (1987) that vessels of up to 182m in length and 8.5m draft could be handled at this pier.

Brighton Pier is brightly illuminated at night and is usually visible from any part of the Gulf of Paria.

A flagstaff and a hotel, standing on the slope of a hill close SE of the root of Brighton Pier, are conspicuous from seaward. Eight chimneys, with several tanks in their vicinity, stand S of the root of the pier and are conspicuous. A prominent silver-colored tank stands at an elevation of 67m, 0.5 mile SE of the hotel.

Aspect.—A lighted range, bearing 139° 15', is situated at Brighton and indicates the approach channel.

Pilotage.—Pilotage is compulsory for vessels berthing at La Brea or Brighton. Pilots can be contacted by VHF and board about 2 miles off Brighton Pier.

Anchorage.—Anchorage can be taken, in depths of 13 to 15m, mud, about 0.8 mile NE of Brighton Pier.

Caution.—Anchorage is prohibited in the vicinity of the submarine pipeline as charted.

A spoil ground is located W of and parallel to the approach lane, as best seen on the chart.

Oil drilling operations take place within 2.5 miles NE through N to SW of Brighton Pier. Numerous drilling platforms, obstructions, and submarine pipelines may be encountered in this area.

1.38 Guapo Bay is a slight indentation in the coast formed between Point Galba (10° 15'N., 61° 38'W.), located 0.5 mile SW of the root of Brighton Pier, and Point Fortin, 4.5 miles SW. This bay is shallow and its E part is encumbered by a bank, which dries. Pelican Rocks, 1.5m high, lie on the bank, 1 mile SW of Point Galba.

Point Fortin (10° 11'N., 61° 41'W.) (World Port Index No. 11770), an oil-loading terminal, has a loading pier situated at the seaward end of an illuminated viaduct. This viaduct carries a pipeline and extends 1.8 miles NNW from Point Fortin. There are two arms at its head.

Tides—Currents.—The currents off the jetty heads set 250° on the flood and 055° on the ebb. The current turns about the time of HW at Georgetown. The maximum rate is about 0.5 knot at springs.

Depths—Limitations.—Berth No. 1, on the seaward side of the NE arm, is 213m long and has a depth of 11.9m alongside. It can accommodate vessels of up to 45,000 grt.

Berth No. 2, on the seaward side of the SW arm, is 213m long and has a depth of 10.9m alongside. It can accommodate vessels of up to 25,000 grt.

Berth No. 3, on the inner arm of the SW side, is 91m long and has a depth of 10.5m alongside. It can accommodate vessels of up to 6,000 grt.

Berth No. 4, on the W side of the viaduct and about 0.8 mile from its root, is 91m long and has a depth of 4.4m alongside. It can accommodate vessels of up to 3,000 grt.

Berth No. 5, an offshore loading terminal for large tankers, is situated about 0.8 mile N of Berth No. 1. Tankers up to 259m in length and 16m draft can be handled here but are berthed by day only.

A submarine cable extends between the head of the jetty and the offshore mooring buoys situated about 0.8 mile NNE.

Pilotage.—Pilotage is compulsory. Pilots can be contacted by VHF and board about 0.5 to 1.0 mile NW of the jetty light. Vessels should send ETA messages 72, 48, and 24 hours in advance. Changes of 1 hour in the ETA should be reported. Tugs are available and required for berthing vessels of more than 30,000 dwt at the outer berths.

There is a port radio station at Point Fortin.

Caution.—Soldado Marine Oil Fields lie up to 10 miles off the coast between Point Fortin and Icacos Point, the SW end of Trinidad, 14 miles WSW. Within this area there are numerous drilling platforms and associated structures, many of which exhibit lights. Many submarine pipelines connect these structures and converge on a landing place in Irois Bay.

The oil field has been declared a restricted area, within which navigation is prohibited to all vessels except those connected with oil field operations and small craft. Anchoring, trawling, and all seabed operations are prohibited.

The N and W limits of the restricted area are marked by lighted buoys.

A further group of lighted oil platforms and wells exist between 1 mile and 5 miles from the W to NE of Soldado Rock outside the Soldado Restricted Area. A submarine pipeline is laid ENE between this group and Riser Platform No. 1 (10˚ 10'N., 61˚ 51'W.).

1.39 Irois Bay (10˚ 10'N., 61˚ 44'W.), which is shallow, is a slight indentation in the coast. It is formed between Point Fortin and Point Rouge (10˚ 09'N., 61˚ 47'W.), 6.8 miles WSW. Challenger Shoal, a detached patch, has a least depth of 5.5m and lies 2 miles N of Point Rouge. Several shoal heads lie S of a line extending from Point Fortin to Challenger Shoal and vessels should not proceed S of this line.

Granville Bay, a slight indentation, lies between Point Rouge and Cedros Point, 2 miles WSW. This bay is fronted by foul ground which extends up to 1 mile offshore.

Cedros Bay (10˚ 07'N., 61˚ 52'W.), a shallow indentation, has depths of less than 5m and lies between Cedros Point and Los Gallos Point, 5.8 miles SW.

Barrel of Beef, a rock with a depth of 1.5m, lies 1 mile WNW of Cedros Point. Loo Reef, with a depth of 1.8m, lies close W of Barrel of Beef and is marked on its N side by a lighted beacon.

A shoal, with a least depth of 4.6m, lies 0.8 mile NW of the above beacon. The remains of a light structure stand close NW.

The coast extending SW of Los Gallos Point has been described under the principal description of the S coast of Trinidad.

The Gulf of Paria—West Side—Punta Penas to Punta Mata Redonda

1.40 Punta Penas (10˚ 44'N., 61˚ 51'W.) is the E extremity of Peninsula de Paria; Punta Garcitas is located 5 miles SSW of it.

Ensenada Cariaquita (10˚ 40'N., 61˚ 54'W.) is entered between Punta Garcitas and Punta Picua, 0.8 mile SW, and provides good anchorage to small vessels. The shore bank, with depths of 5m or less, extends up to about 0.1 mile WNW of Punta Garcitas. Rocks, with depths of less than 1.8m, are located close N and about 0.2 mile WNW of Punta Picua. The head of the bay is shoal and, at times, a considerable current sets across the entrance to the bay.

The coast between Punta Picua and the entrance to Puerto Macuro, 2 miles SW, is composed of red cliffs in places.

A shoal, with a depth of 10.4m, lies about 0.5 mile ESE of the SW entrance point of Puerto Macuro.

Puerto Macuro (10˚ 39'N., 61˚ 56'W.), formerly Cristobal Colon, is divided into two parts by a point, which has a pier in ruins at its outer end. The E part is known as Ensenada Aricagua while the W part is known as Ensenada Macuro. The town of Macuro stands at the head of Ensenada Macuro.

Tides—Currents.—The tidal currents in Puerto Macuro attain rates of 1 to 2 knots. The flood current runs clockwise around the harbor; the ebb current runs counterclockwise. The latter current attains the greater rate and reaches its maximum 2 hours before LW by the shore. In the middle of the bay, slack water occurs 1 hour after the stand of the tide.

Depths—Limitations.—A wharf extends 165m ENE from a point on the shore located 0.3 mile NNE of the W entrance to Puerto Macuro. It has been reported that vessels of up to 7.9m draft can berth alongside. Two mooring buoys lie close N of the wharf; one mooring buoy lies close S of the wharf.

Regulations.—In Venezuelan territorial waters, the Venezuelan flag must be continuously displayed at the fore. At night, on request, the vessel's name must be signaled by light.

Anchorage.—Small vessels can anchor anywhere in the bay, but large vessels should anchor just outside a line joining the entrance points.

Except in cases of shipwreck or "force majeure," vessels are prohibited from anchoring within the territorial waters, except off these ports or places used for commerce.

1.41 The coast between Puerto Macuro and Punta Carmona, 12 miles W, is indented by several small bays and backed by a mountain range with peaks up to 1,073m high. Large spurs extend S from this mountain range and terminate in points which form deep gorges at the head of some of the bays.

Puerto de Hierro (10˚ 38'N., 62˚ 05'W.) (World Port Index No. 12275), a natural coastal harbor, is located 9 miles W of Puerto Macuro and formed by a small bight. The port, under control of the Venezuelan Navy, is primarily an ore-transshipment facility.

Tides—Currents.—The tidal currents set W on the flood tide and E on the ebb at rates up to 2.5 knots.

Depths—Limitations.—The ore-loading pier extends 400m SSW from the E side of the bight. The E side of the pier has depths of 5.2 to 7.9m over a usable length of 210m. The W side of the pier has depths of 3.3 to 4.6m over a usable length of 182m. Dolphins are situated off the head of the pier and a shoal, with a depth of 4m, lies adjacent to them.

A small pier, with depths of 3m along its E side, extends 76m S from a point located close W of the root of the ore pier.

The bay has been reported to have been dredged to a depth of 12.8m, but the 5m curve lies within the approach to the W side of the pier and depths of up to 8.1m lie in the approach on the E side.

The maximum size of vessel permitted to enter the port is 45,000 dwt.

Aspect.—The pier, with its towers and oil storage tanks, is prominent when seen from the S and W. At night, a group of lights above the port may be seen at a distance of 20 miles.

Pilotage.—Pilotage is compulsory. Pilots may be obtained from Guiria. Vessels should give 72 hours notice and confirm or amend their ETA 48 hours and 24 hours before arrival. Vessels are berthed by day or night, but normally only at slack water.

Anchorage.—Anchorage can be taken, in a depth of 16m, sand with good holding ground, about 1 mile S of the pier head.

Directions.—Entry is difficult and berthing only at slack water is recommended. Vessels should enter with as little way on as possible and approach the pier on a heading of 021°.

Caution.—It was reported that silting occurs in the harbor.

Punta Carmona (10° 38'N., 62° 09'W.) is located 3 miles W of Puerto de Hierro. From the former point, the coast trends 3.3 miles W to Punta Juan Diego, then 3 miles W and 2.5 miles S to Punta El Rincon, and then 2 miles S to Punta Guiria. The bight in the coast lying NE of Punta Guiria is fronted by a shoal area. This area has depths of less than 11m and extends up to 2.5 miles offshore. A detached shoal, with a least depth of 5.8m, was reported (1940) to lie about 1 mile SE of Punta Guiria.

1.42 Guiria (10° 34'N., 62° 18'W.) (World Port Index No. 12270), a small harbor protected by breakwaters, lies close N of Punta Guiria.

The town stands on a low plain. The port is important as a pilot boarding station for vessels proceeding to the river ports on the S side of the Gulf of Paria.

Depths—Limitations.—There are depths of 5 to 6m within the breakwaters, except alongside the berths, where less water may be found. A shoal patch, with a depth of 3.2m, lies in the center of the harbor.

A quay, 140m long with refrigeration facilities, is situated on the inner side of the S breakwater near its head. Three piers project N from the breakwater, W of the quay. The W pier is used by vessels carrying dangerous cargo.

A quay, 170m long, is situated on the inner side of the N breakwater, 0.5 mile from its head.

Four piers project from the W side of the harbor. The N pier is reserved for naval vessels.

Aspect.—The port may be identified by the prominent red-roofed towers of a church. Several radio towers and a white tank stand on the high cliffs, close N of the town.

Recalada Guiria Light, shown from a white tower with orange bands, 12m high, stands 1 mile N of the port.

Pilotage.—Pilots for Maturin Bar, the Rio San Juan, Pedernales Bar, and the Orinoco Delta can be obtained at Guiria. Incoming vessels must request pilot service by radio 72 hours, 48 hours, and 24 hours prior to arrival. Pilots can be contacted by VHF and usually board in the vicinity of the lighted buoy moored 2 miles ESE of the town, within 1 hour after arrival. It is not necessary to anchor. If for any reason the pilot is delayed, vessels can anchor in the vicinity of the buoy.

Vessels approaching Guiria should identify themselves to the signal station and not proceed inshore of the pilot boarding station at the above lighted buoy.

Anchorage.—Anchorage can be taken E of the harbor, in depths of 10 to 11m, mud with good holding ground.

1.43 The coast between Punta Guiria and Punta Guaraguara (10° 32'N., 62° 19'W.), 2.5 miles SW, is cliffy and tree-covered.

Between Punta Guaraguara and Punta Arenas, 23 miles SW, the W part of the Gulf of Paria is almost entirely encumbered by shoals and fringing flats. There are no commercially-significant ports within this area.

Three detached shoals, with depths of less than 10m, lie between 6.5 miles and 9 miles SW of Punta Guaraguara. Vessels bound for Barra de Maturin are advised to pass E of these patches. It was reported that lesser depths than charted lie in the vicinity of, and on the patches described above.

The **Rio San Juan** (10° 15'N., 62° 36'W.) discharges into the Gulf of Paria between Punta Arenas (10° 20'N., 62° 38'W.) and Punta Campana, 6.5 miles SSE.

Barra de Maturin (Maturin Bar) lies across the mouth of this river and has a dredged channel with a least depth of 7.9m. It was reported (1995) that vessels with drafts up to 10m were permitted to use this channel.

It was reported (1993) that silting had changed the shape of the charted coastline in the vicinity of Punta Campana. A lighted buoy is moored about 9 miles NE of Punta Campana and marks the entrance to the dredged channel. From this buoy to Punta Gorda, located 4.5 miles SSW of Punta Campana, each reach of the dredged channel is indicated by lighted ranges. A number of beacons are situated in the vicinity of the channel and should not be confused with the range lights.

From a point located 2 miles SSE of Punta Gorda (10° 10'N., 62° 38'W.), the channel has depths in excess of 11m as far as Punta Carner, 32 miles upriver.

The Cano Frances joins the Rio San Juan, 20 miles above its mouth. It is about 230m wide and trends SW for almost 13 miles. It is joined here by the shallow and narrow Rio Guarapiche, which trends W for 3.5 miles to the Cano Colorado. From the junction of the Cano Frances and the Rio Guarapiche, a stream, known as the Cano dos Aguas, trends in a N direction and joins the Rio San Juan 7 miles below Punta Carner. One-way traffic is operated in the Rio San Juan above its junction with the Cano Frances at Punta Marieta. Inbound vessels required to wait may anchor in this area.

The Rio Guanoco empties into the Rio San Juan, close W of Punta Carner. The village of Guanoco stands on the W bank of the Rio Guanoco, 3 miles above the junction.

Caution.—Vessels are advised that the currents are strong over the bar and within the river.

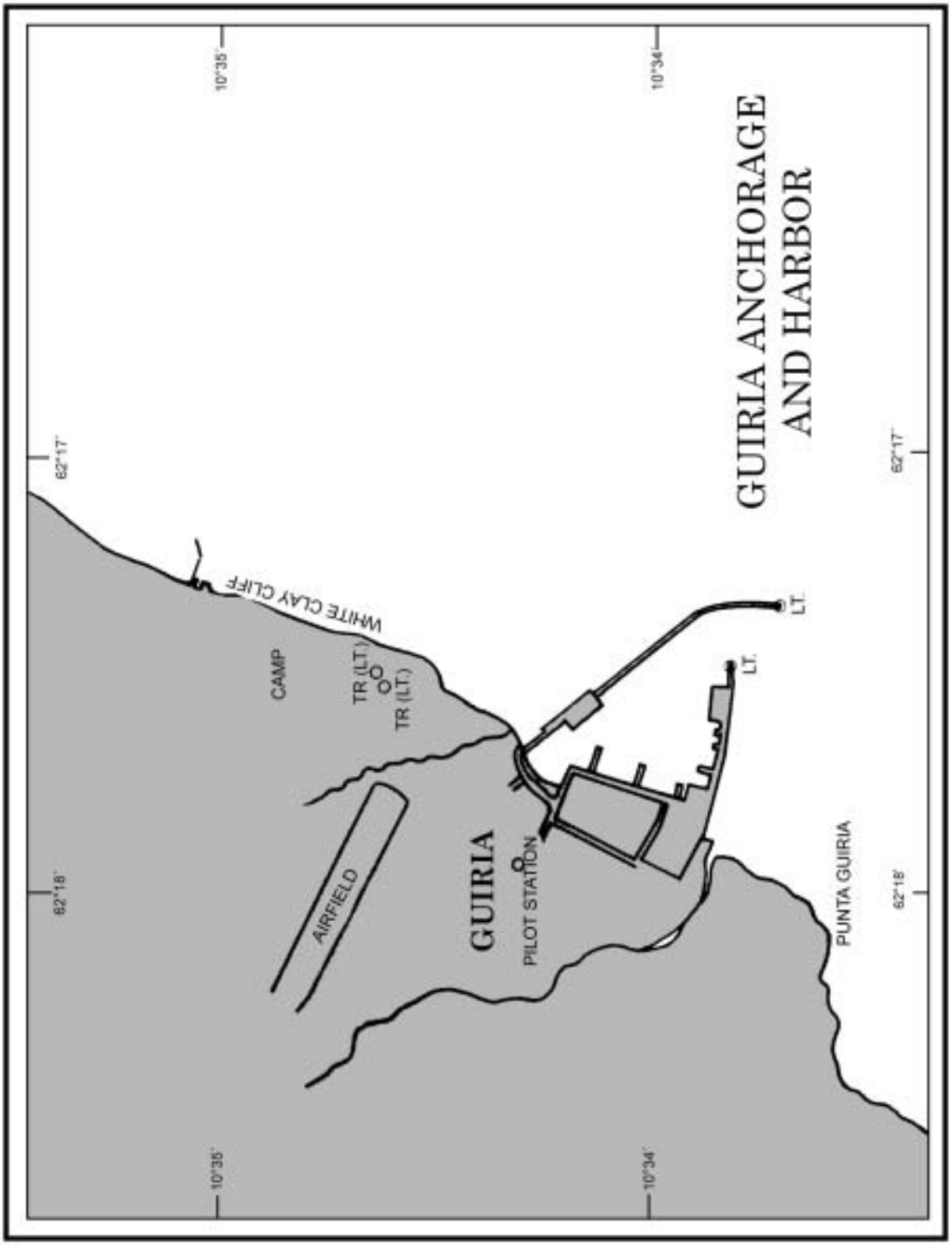
1.44 Guanoco (10° 10'N., 62° 56'W.) (World Port Index No. 12290) is situated at the base of two hills, 107m and 76m high. A large deposit of pitch is located here.

Depths—Limitations.—A wharf, with a depth of 7.6m alongside, fronts Guanoco. The approach to Guanoco through the Rio Guanoco is only suitable for vessels with local knowledge. The river is about 140m wide and has depths of 3 to 9.1m in the fairway. The controlling depth in the channel is 5.5m.

The river above the mouth of the Rio Cicaro is narrow. Vessels are turned at this junction and towed stern first about 0.8 mile up to the wharf at Guanoco. Vessels should moor their sterns very securely because of the strong currents. Vessels up to 85m in length can negotiate the turns when loaded.

Pilotage.—Pilotage in the Rio San Juan is compulsory. Pilots can be obtained at Guiria, but 3 days advance notice is required.

From **Punta Carner** (10° 07'N., 62° 57'W.), the Rio San Juan trends in a SW direction and then NW to Caripito, which stands 51 miles above the entrance to the river.



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1.45 Caripito (10° 10'N., 63° 02'W.) (World Port Index No. 12280) is situated on a tributary of the Rio San Juan, 3 miles W of the river. It is connected to the port area by rail and road.

Depths—Limitations.—Vessels entering are restricted to a maximum draft of not more than 10.4m.

Three piers and a wharf front the W bank of the river. The wharf, which is known as Muelle No. 1, is 107m long. It can accommodate vessels of up to 137m long and 7m draft.

Muelle No. 2 and Muelle No. 3 are T-head piers, with dolphins situated close off their faces. They have a depth of 10.7m alongside. Vessels of up to 61,000 dwt, 230m in length, and 10.3m draft can be accommodated at these piers.

Muelle No. 4 is situated upstream of Muelle No. 1. Its T-head is 12.2m long and has a depth of 4.3m alongside.

Tankers of up to 52,000 dwt, 225m in length, and 10m draft can be accommodated within the port. The usual method of berthing is for vessels to proceed up river from the piers and turn around. If necessary, arrangements can be made for vessels to top off seaward of Barra de Maturin.

Pilotage.—Pilotage is compulsory. Pilots are embarked and disembarked at the port of Guiria. Vessels awaiting a pilot should proceed to the Guiria Sea Buoy (10° 33'N., 62° 15'W.) and display the usual signals.

Anchorage.—Vessels unable to berth at Caripito usually anchor about 0.5 mile upriver. However, at times, the current attains a rate of 3.5 knots. Anchorage is also available in a depth of 14m about 0.3 mile upstream.

Caution.—It was reported (1995) that many beacons were unlit or destroyed completely.

Mouths of the Rio Orinoco within the Gulf of Paria

1.46 From Punta Campana to Punta Mata Redonda (10° 12'N., 62° 31'W.), 5 miles SE, the coast is fringed by a drying mud bank extending up to 0.8 mile seaward. A dangerous wreck, marked by a buoy, is located 9.5 miles E of Punta Mata Redonda. Between Punta Mata Redonda and Punta Tolete, 22 miles SE, the coast is indented by a large shallow bay, which has depths of 5m and less over its entire area. The bay is largely filled with mud flats and is navigable only by the smallest craft. The W of the intricate network of waterways, which intersect the delta of the Orinoco, lies at the S end of the bay. Nearly the entire shore of the bay is covered by a dense growth of trees of uniform height.

Several islands lie within the bay and are separated by rivers. From W to E, these rivers are the Cano Jacao, the Cano Vagre, the Cano Mananito, the Cano Manamo, and the Rio Pedernales.

The Rio Pedernales, the most important of these rivers, is entered between Isla Cotorra and Punta Tolete (10° 02'N., 62° 12'W.), 1 mile E. It was reported that the bar had a least depth of 3.4m, but silting causes rapid changes. The bottom is soft with good holding ground. Three lighted buoys mark the entrance of the Rio Pedernales. Buoy No. 1 is moored in position 10° 04'N.,62° 07'W

Within the bar, the Rio Pedernales divides into two channels. The E channel leads to the Cano Pedernales and the W channel to the Cano Manamo. The latter channel is used by coastal vessels.

The tides rise about 1.6m at springs and 1.2m at neaps.

When the river is low, the currents in the vicinity of the bar are weak and set in a NE and SW direction. Within the bar, slack water occurs 1 hour 30 minutes after the stand. The currents usually set in the direction of the channels and attain rates of 2 to 3 knots.

1.47 Puerto Pedernales (9° 59'N., 62° 15'W.) (World Port Index No. 12300) stands on the N end of Isla Pedernales, 4.5 miles SW of Punta Tolete.

Oil installations are situated in the vicinity of Puerto Pedernales. Capure, 0.8 mile NE of Puerto Pedernales, is the site of a T-head pier which is used by small tankers with drafts up to 4m. An older wharf is situated about midway between Capure and Punta Tolete.

Pilotage.—Pilotage is compulsory. Pilots embark at Guiria and will take vessels upriver as far as Ciudad Bolivar.

Anchorage.—Anchorage is also available, in a depth of 9m, fine gray sand, abeam of a village situated about 1 mile SW of Punta Tolete.

Punta Tolete to Punta Baja

1.48 The coast that forms the S side of Serpents Mouth extends 80 miles E and SE to Punta Baja and encompasses part of the delta of the Rio Orinoco. This part of the coast has been only partially surveyed. Depths of 18m have been reported to lie 4 to 5 miles off the W section of the coast, decreasing gradually toward the shore. Similar depths are reported to lie up to 13 miles off the E part of this coast.

Punta Bombeador (9° 55'N., 61° 40'W.) is located 34 miles ESE of Punta Tolete and has a bank, with a least depth of 2.7m, extending 3 miles NW from it. A channel leads in a SW direction through this bank to the mouth of the Cano Macareo. The maintenance of this channel has been discontinued and the navigational aids removed. Local knowledge is required.

The Cano Macareo is entered S of Punta Pescador (9° 53'N., 61° 39'W.), about 1.5 miles SSE of Punta Bombeadar. It connects with the Rio Orinoco and is used by shallow draft vessels. Pilotage is compulsory. The current at the mouth of the river attains a rate of 2 knots from December through April and 3 knots from May through November.

The coast between Punta Bombeador and Punta Baja, 48 miles SE, is intersected by several shallow waterways and fronted foul ground extending up to 6 miles offshore in places.

The Rio Orinoco Delta

1.49 From **Punta Baja** (9° 31'N., 60° 58'W.), the coast of Venezuela extends 64 miles SE to Punta Barima. This latter point is located at the SE end of the delta of the Rio Orinoco.

The delta has its origin at a point below Barrancas, 120 miles upriver from Punta Barima, and is comprised of several rivers and streams.

Boca Grande, the main entrance to the Rio Orinoco, flows through the S side of the delta and has two channels which lead through it.

The coast in the vicinity of Boca Grande is difficult to distinguish and it is advisable to take soundings continuously. It has been reported that vessels can go aground to the N of the

mouth while still out of sight of land. Approaching Boca Grande from the N, vessels are usually in shallow depths before any landmarks are sighted. In the approach to the bar, the bottom consists of soft gray mud. During heavy weather, a high and dangerous sea breaks over the bar. Care should be taken not to approach within 2.5 miles of Punta Barima, because discolored water makes the steep-to banks invisible. The bar extends up to about 20 miles seaward.

The channel leads over Boca Grande bar into the Rio Grande branch of the Rio Orinoco off Punta Yatica. It then extends 15 miles to the Brazo Imataca reach, which leads S and W for about 47 miles, and rejoins the Rio Grande near the village of Sacupana. The channel then follows the Rio Grande for about 36 miles to the bifurcation of the Rio Macareo, passing N of Isla Tortola. The channel then follows the main fairway of the Rio Orinoco for 53 miles from Barrancas to Matanzas.

Tides—Currents.—In the approach to Boca Grande, the South Equatorial Current sets NW at a rate of 1 to 3 knots. Between the discolored river water and the sea water, there is a distinct line which moves with the tides. At HW, the line is in depths of 7 to 9m and in depths of 11 to 14m at LW.

For a short distance offshore, the currents set for about 6 hours each way and allowance must be made for the W current when crossing the bar.

A choppy sea is raised in depths of less than 18m when the prevailing winds are NE.

The seasonal rise of the Rio Orinoco and its tributaries begins immediately after the vernal equinox and reaches its maximum height in July and August. The lowest level is reached in mid-November through mid-April, but at Ciudad Bolivar, the river is low from December to March.

At Barrancas, at the head of the delta, the maximum rise is about 9.1m. Above Barrancas, the normal rise is estimated to be about 15.2m, varying according to the width of the river, the number of tributaries, and the distance from the sea.

The average annual rise at Ciudad Bolivar is 12.8m.

Depths—Limitations.—The North Channel leading through Boca Grande is available to shallow draft vessels and small craft. A lighted buoy located 9 miles NW of the dredged channel approach buoy marks the entrance to the N channel. It joins the water of the dredged channel, 6 miles NNW of Punta Barima. It was reported (1990) that this channel no longer exists.

The South Channel is used by deep-draft vessels proceeding to Puerto Ordaz and the iron ore port, located 157 miles upriver from Punta Barima. The South Channel is also used by vessels proceeding to Matanzas, another iron ore port, situated 12 miles farther upstream. The bar channel depth is maintained in accordance with the authorized draft in the upper river and has been reported to vary between 9.9m and 13.7m at LW and HW stages, respectively. The waterway is open to shipping 24 hours a day and, except for the dredged channel section, two-way traffic can be handled. Vessels should contact Puerto Ordaz Port Radio before attempting transit and entry of the port.

The river is maintained and marked from the dredged South Channel Lighted Buoy to Matanzas for vessels with drafts of up to 12.8m (1987), under optimum river level and tide conditions. Under extreme low river conditions, the authorized draft should not be more than 9m. The months of the lowest water level in the river are March and April. The highest water level occurs from July to October.

The daily authorized draft is promulgated by the Port Captain of the Rio Orinoco, by means of a bulletin in Spanish and English. The maximum authorized draft is subject to the vessel's maximum fresh water load line.

Vessels with drafts up to 2.3m can at all times reach Ciudad Bolivar. From May to January inclusive, vessels with drafts up to 4.6m have no difficulty ascending to this city, but the best months are said to be from June to October.

Pilotage.—During the passage over the bar and within the river, vessels must maintain a continuous radio watch. Radio stations are situated at the pilot station, Punta Barima, and Puerto Ordaz. These stations provide voice communications along the entire route. The River Officer at Puerto Ordaz, by reference to the mile numbers of the navigational aids, provides continuous radio information of the latest positions of vessels in the dredged channels and the river. Vessels must report their positions in the river hourly to Puerto Ordaz, from where all traffic is controlled.

Vessels should not enter the dredged channel until permission is received from the pilot station or Radio Marina Puerto Ordaz. Vessels without permission are required to remain at anchorage 1 mile W of the approach buoys for either N or S channel. Once permission is granted vessels should send their ETA at Lighted Buoy No. 28 to the pilot station. Once in the New Barima channel position reports are due every hour.

Pilotage is compulsory for transiting the Rio Orinoco. Subject to a vessel's ETA being reported by radio, the pilot will board in the vicinity of Lighted Buoy No. 28, about 5 miles W of Punta Barima. The ETA should be sent as soon as possible and again 24 hours in advance of arrival at Punta Barima. Actual arrival at the Approach Buoy should be reported to the pilot stations by voice radio and the position of the vessel reported hourly until the pilot is embarked.

Pilots board and disembark vessels in the vicinity of Mile 36, due to sea conditions at the sea buoy which prevent boarding from small boats. Once the pilot boards vessels should send the name and time of boarding to the pilot station.

The pilot stations at Palua and Ciudad Bolivar are in radio communication with the stations at Punta Barima and Puerto Ordaz.

The pilot usually remains on board the vessel for the return trip, unless the duration of stay is expected to be lengthy.

Regulations.—Outbound vessels have the right of way.

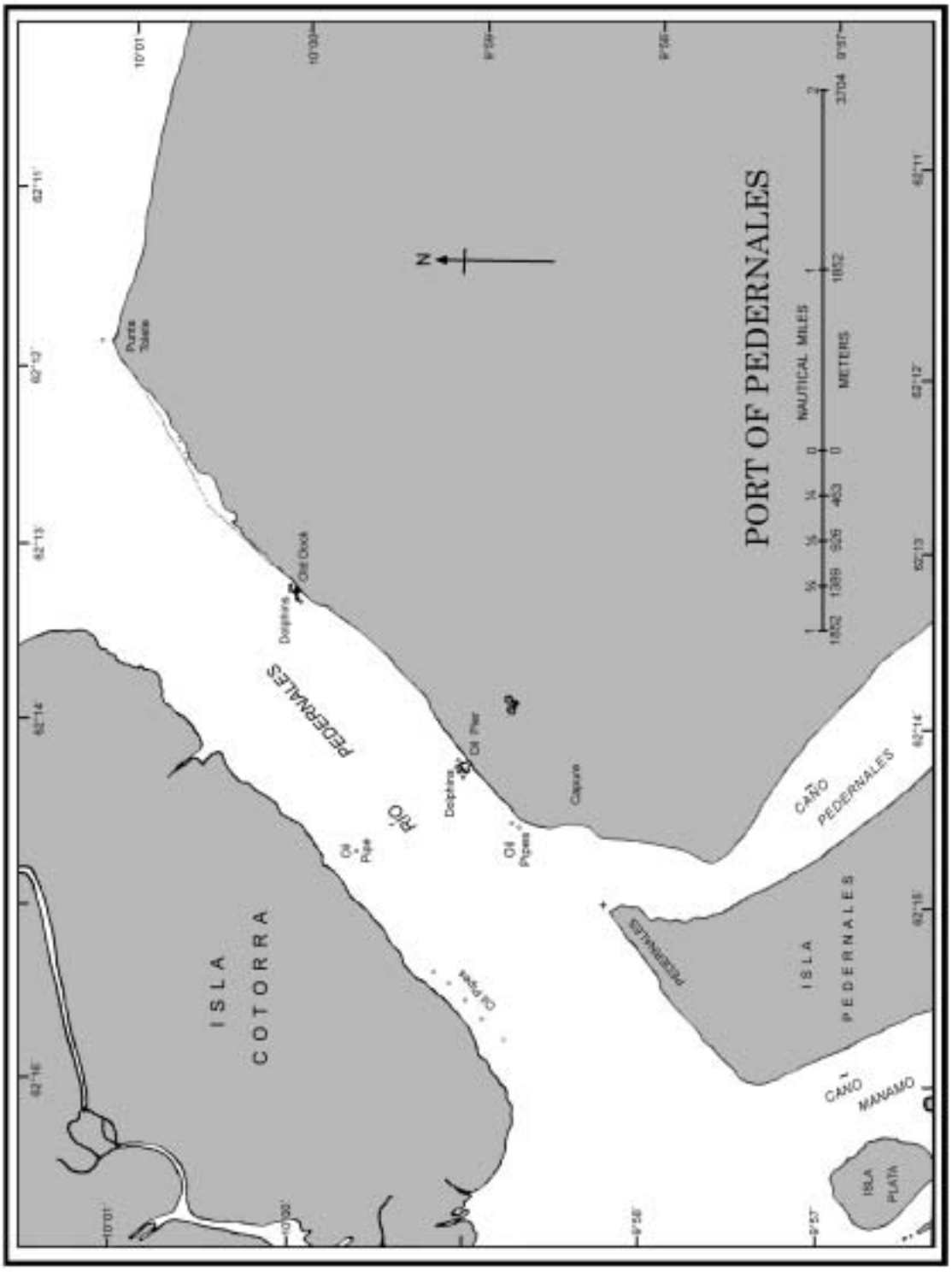
Vessels entering the river must carry only clean ballast.

Vessels must display the Venezuelan flag at all times from the time of entry into the approach channel leading into the Rio Orinoco.

No vessel is allowed to anchor in the narrow channels of the river or close to a turn.

All vessels needing to anchor in the area between Punta Barima and Mile 137, at the junction of the Cano Macareo, can do so; however, vessels must anchor as close as possible to the right hand bank.

Emergency anchorage must be taken in such a way as to avoid obstructing the channel.



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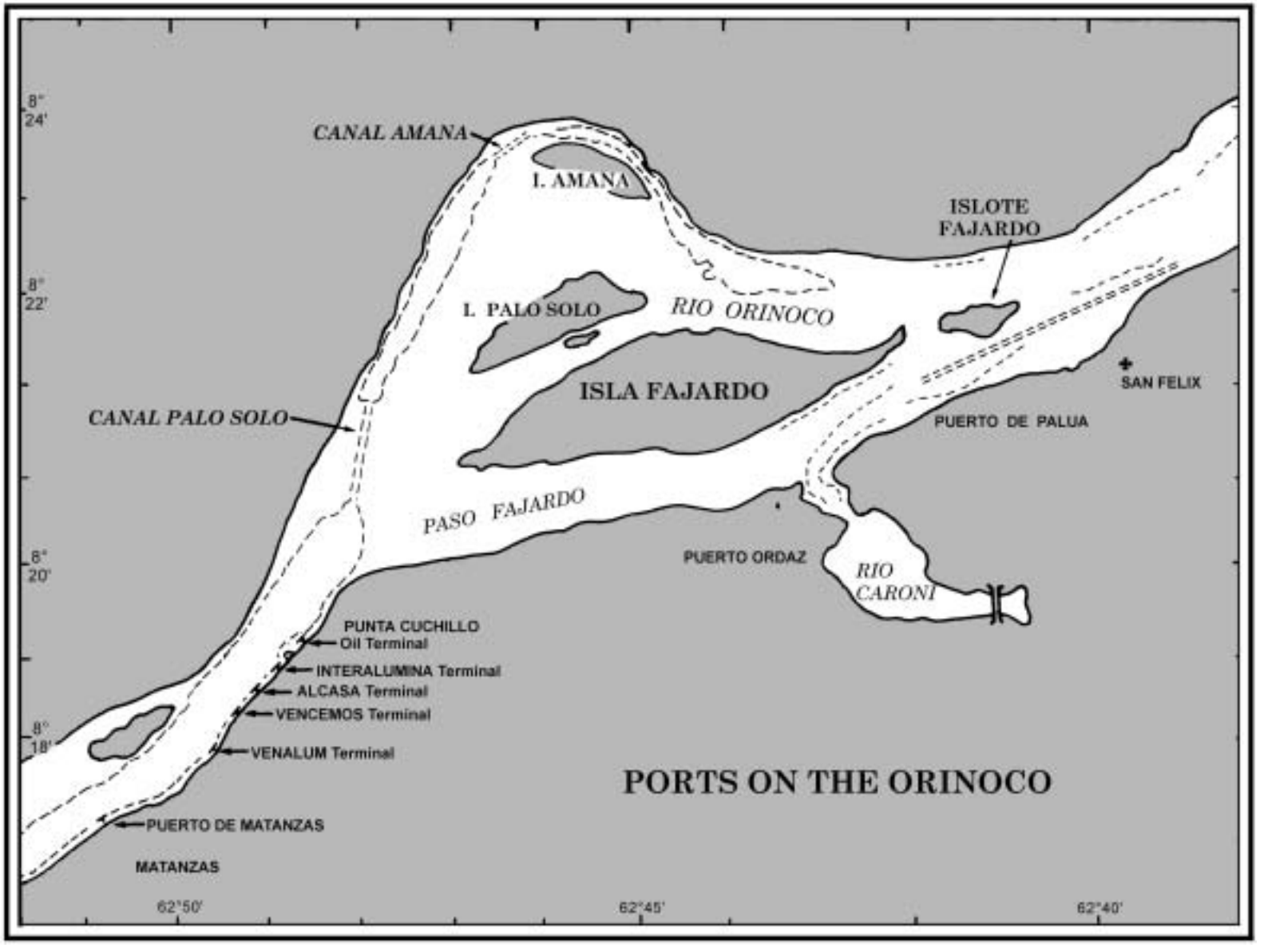

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River regulations provide for anchoring, as follows:

Mile marker	Depth
139.3 to 140.4	12.8 to 20m
150.1 to 151.7	22 to 27.4m
178.0 to 179.0	23.8m

During HW stage, usually from May 15 to November 15, anchorage can be taken at the junction of the Rio Orinoco and the Rio Caroni, within 1 mile of the ore loading berth.

Prior to entering the dredged channel from seaward, vessels must contact Puerto Ordaz port radio station and report their name, nationality, and ETA off the pilot station at Punta Barima. Vessels will then be given instructions either to enter, anchor, or wait for an outbound vessel to clear the channel. In the waterway, the outbound vessel is privileged.

Signals.—Vessels should exercise extreme care when meeting or passing dredges. Dredges working in the dredged channel through the bar in the approach to the Rio Orinoco use the International Code of Signals. Those working in the Rio Orinoco use the signals described below:

1. Vessels approaching a dredge should sound one long and three short blasts.
2. If the dredge then sounds one short blast, the vessel is to direct course to starboard and keep the dredge on the port bow.
3. If the dredge then sounds two short blasts, the vessel is to direct course to port and keep the dredge on the starboard bow.
4. If the dredge then sounds two long and two short blasts, the vessel must not pass the dredge.
5. The dredge signal must be answered by the vessel.
6. If two vessels are approaching the dredge from opposite directions, the dredge will answer the outbound vessel first.

The operating frequencies for YVM Marine Radio in Puerto Ordaz are 468 kHz, 4192 kHz, 6265 kHz, 6320 kHz, and 8386 kHz.

The GMT-CQ and frequencies are:

a. 472kHz
b. 4322 kHz—0300, 0900
c. 6372.5 kHz
d. 5 kHz—1200
e. 8453 kHz—0030, 1430, 2000

Upon contact with YVM Marine Radio Station, vessels will receive all navigational information for transit of the Rio Orinoco, and also channel clearance upon request to Port Captain at Ciudad Bolivar.

Vessels may also contact the port on VHF channels 6, 13, 14, and 16.

Anchorage.—Anchorage can be taken, in a depth of 26m, at Matanzas, about 0.8 mile NE of the head of the pier.

The river is narrow at Ciudad Bolivar and there are depths of 27 to 55m at low river stage. Anchorage can be taken with a single anchor, in a depth of 12.8m, about 0.2 mile E of the market place and 0.2 mile offshore. This berth is out of the main river current and vessels will not swing more than 45°. The currents attain a rate of 5 knots between August and December.

Good temporary anchorage can be taken in the vicinity of the lighted approach buoy, clear of the entrance. This buoy, equipped with a racon, is the landfall for the dredged channel. Secure anchorage can be taken off Punta Barima with the disused lighthouse bearing 100° and distant 4 miles.

Caution.—It was reported (1993) that some of the lighted ranges were inadequate. Night transit is not recommended.

It was reported (1986) that strandings in the Rio Orinoco had increased significantly. The river is navigable by large vessels up to about 200 miles above the sea buoy. Over most of this distance, vessels must negotiate a narrow channel, said to be only 99m wide between buoys, which is subject to strong cross currents. The variation in the channel depths is considerable, varying according to season in the upper river above Mile 44, and tidal below.

A feature of the Rio Orinoco is that the bottom consists of a layer of very soft mud, virtually in suspension and partly mobile, which is known locally as the "calambrina." The consistency of this mud is such that it shows on most echo sounders, but the depth shown depends partly on the frequency of transmission. The "calambrina" is more pronounced in the summer months, when rainfall in the interior is high, bringing down sediment in the river. The existence of the "calambrina" and its mobility makes it difficult to calculate the actual depth of water in the channel.

Vessels are warned that the "calambrina" may severely hinder their passage across the bar. Vessels with drafts of more than 7.5m are likely to have to force a passage through a layer of mud, 1m or more thick, with a consequent loss of speed up to 50 percent.

The Instituto Nacional de Canalizaciones (INC) publishes daily bulletins that give the controlling depths, authorized drafts, etc., for the river.

All navigational aids are numbered on the chart with their distance in miles from the seaward entrance to the dredged channel through Boca Grande.

The dredged channel is 30 miles long and 122m wide. The channel is marked by lighted beacons and lighted buoys; however, it was reported that many of these aids differ from those charted. Up-to-date information will be given by the radio station at Puerto Ordaz. Many of the lighted ranges were reported (1986) to be defective and the channel is not recommended for deep-draft vessels at night.

River distances.—The river distances are shown below.

Positions	Distance between positions	Total distance from Punta Barima
Boca Grande Waterway Entrance (sea buoy) to Punta Barima	27	27
Punta Barima to Punta Yatica	15	15
Punta Yatica to Curiapo	18	33
Curiapo to Sacupana	48	81
Sacupana to Barrancas	35	116
Barrancas to Los Castillos	18	134
Los Castillos to San Felix	19	153
San Felix to Pulua	2	155

Positions	Distance between positions	Total distance from Punta Barima
Palua to Puerto Ordaz	2	157
San Felix to Matanzas	16	169
Matanzas to Ciudad	43	212
Ciudad Bolivar to	62	274
Muitaco to Quanare	17	291
Quanare to Boca del Inferno	12	303
Boca del Inferno to Mapire	16	319
Mapire to Puerto Ayacucho	310	629

Port Terminal Facilities

1.50 Only the more important port facilities of the Rio Orinoco are included. They are described in ascending order from the seaward to the head of the navigable waterway. Unless otherwise indicated, the distances shown are from Punta Barima.

San Felix (8° 22'N., 62° 40'W.), a general cargo port, fronts the S bank of the river, 153 miles upstream. A floating pier extends from the shore abreast the settlement. Its outer face is 123m long and can accommodate vessels of up to 8.8m draft at low river.

Palua (8° 22'N., 62° 41'W.) (World Port Index No. 12330) stands on the E side of the junction of the Rio Caroni and the Rio Orinoco, 155 miles above Punta Barima.

Berthing alongside the iron ore terminal presents no difficulty, except when the river currents are strong. The use of a tug is advisable at such times. Tugs are generally used for docking and undocking, with a third tug used for vessels with drafts in excess of 10.9m when undocking. Four tugs are available at the port. Docking is always done port side-to.

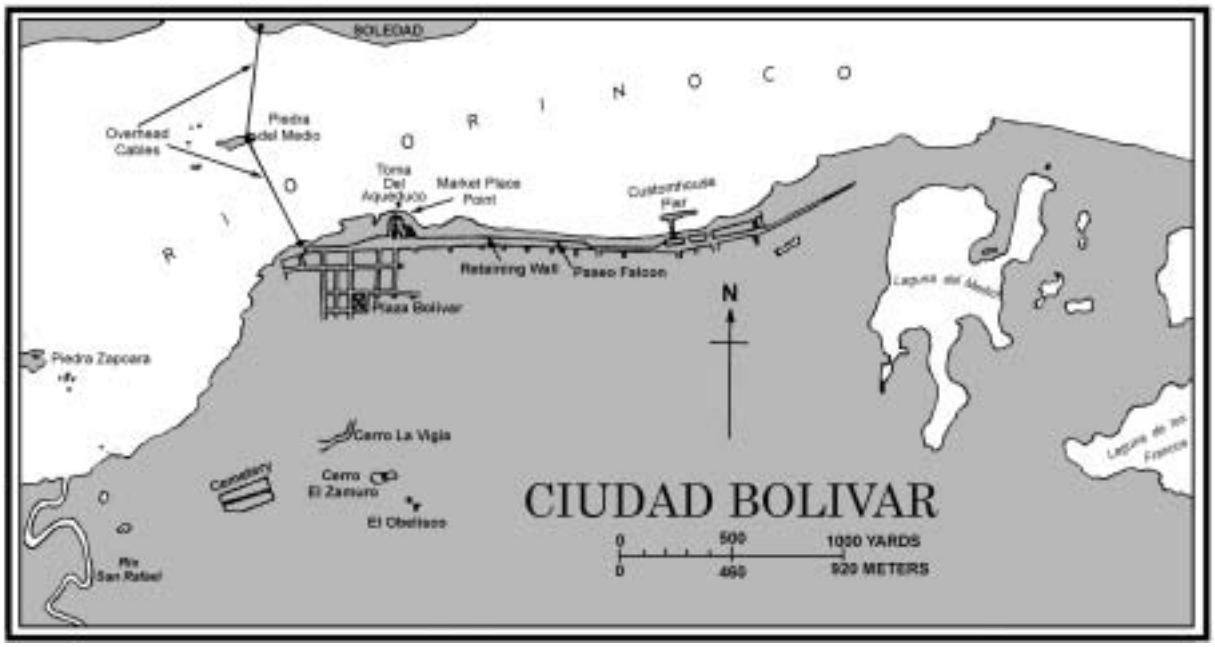
The berthing facilities at the ore loading terminal consist of a pier, about 0.2 mile long, which is aligned upstream and downstream in the general direction of the current. Vessels with maximum drafts ranging from 9.7m to 13.1m can be handled, depending upon the river stage. Vessels of up to 100,000 grt, 274m in length, and 34m beam can be accommodated, provided that ballast can be moved to allow proper loading.

1.51 Puerto Ordaz (8° 21'N., 62° 43'W.) (World Port Index No. 12335), an important ore-loading terminal, stands at the junction of the Rio Caroni and the Rio Orinoco, 157 miles upstream from Punta Barima. A dam extends into the Rio Caroni just above the terminal.

Depths—Limitations.—The port facilities are approached through a buoyed channel and a turning basin, which are maintained by dredging to a depth sufficient to accommodate vessels of up to 10m draft. The width of the turning basin varies between 488m and 610m. The ore-loading wharf, which provides three berths, is 575m long and has a depth of 12.1m alongside.

Between Mile 165 and Mile 167 there are five private terminals.

Punta Cuchillo Oil Terminal consists of a T-headed platform, 20m long, with two mooring dolphins. It can accommodate vessels of up to 47,000 dwt. The platform has a depth of 12.2m alongside at low river, when the current is negligible. At high river, the current in mid-channel attains a rate up to 6 knots. The loading depth is controlled by the stage of the river in the channel.



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Interalumina Terminal has a concrete pier, 350m long. It can accommodate vessels of up to 60,000 dwt, with drafts of between 9.8m and 12.8m. To berth, it is recommended that the turning basin at Matanzas be used.

Alcasa Terminal has a loading pier, 45m long, with several off-lying buoys. It can accommodate vessels of up to 45,000 dwt ,with drafts of between 8.8m and 12.5m, depending on the stage of the river.

Vencemos Terminal is situated on the E side of the river, about 0.4 mile SW of Alcasa Terminal.

Venalum Terminal is situated on the S bank of the river and handles alumina and aluminum ingots. The terminal consists of a quay, 215m long, with a depth of 12m alongside at LW.

Caution.—Berthing is difficult at the facilities because of the strong currents. Therefore, a docking pilot and tug are used. Several barges are available should it be necessary to lighten vessels in the case of grounding.

The channel buoys are moved as necessary to provide the largest navigable area, depending on the water level in the river.

1.52 Puerto Mantanzas (8°17'N., 62°51'W.), an ore-loading terminal, is situated on the S bank of the river, about 10 miles above Puerto Ordaz. A concrete pier, about 0.7 mile long, provides eight berths.

Vessels of up to about 30,000 dwt and 182m long can be handled ,with drafts up to 7.9m at LW and 9.1m at HW. It was reported (1986) that vessels with drafts up to 12.5m can be handled during the rainy season and with drafts up to 8.5m during the dry season. Berthing can be carried out by day or at night, although the use of a tug is required.

An anchorage area is situated 1 mile downstream from the quay.

1.53 Ciudad Bolivar (8°08'N., 63°33'W.) (World Port Index No. 12340), a port and the capital of the State of Bolivar, is the head of ocean navigation on the Rio Orinoco. It stands about 212 miles from Punta Barima. This city is the most notable of those on the Rio Orinoco and a very conspicuous cathedral is situated in it.

Depths—Limitations.—The berthing facilities consist of a wharf extending along the shore, fronted by two floating stages. These stages provide two berths. The larger of the two has a depth of 4.6m alongside at low river and 9.1m at high river. It can handle vessels of up to 91m in length. Vessels may not sit on the bottom in the vicinity of the berths because the river bed is both uneven and steep. Vessels should approach the berths stemming the current. Vessels can also berth close off the river bank and work cargo over temporary gangways rigged to the shore.

Anchorage.—A depth of 33m lies close offshore at mean river level. Vessels usually obtain anchorage near the E section of the city. This anchorage area is restricted as the middle of the river is deep.